

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

FEB. 1, 1954

50 CENTS

WHEELS and BRAKES by GOODYEAR



FIRST TO QUALIFY UNDER NEW CAA LAB TEST FOR AIRLINE CERTIFICATION !

THE new-type Super Constellation 1049-C transport by Lockheed packs 13,000 horsepower, 133,000 pounds gross weight — but Goodyear wheels and brakes have proved themselves capable of handling the high torque and huge load *within the shortest stopping distance of any equipment tested.*

In so doing, Goodyear equipment becomes the first to qualify for commercial airline certification under the severe new CAA laboratory tests which call for far higher kinetic energy loading than that encountered in any flight-operating conditions.

The basic flexibility of the famed Goodyear Single Disc-Type Brake, coupled with its outstanding record of success in past performances on the nation's leading airliners,* make it the ideal design for meeting the requirements of today's new aircraft.

Other benefits are equally noteworthy: (1) ease of maintenance, (2) parts interchangeability which goes with standardizing on Goodyear equipment, (3) longer brake life with shorter stopping distances, and (4)—above all—*dependability.* Goodyear Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.



** Now being flown on: Douglas DC-7, DC-6, DC-4 aircraft; Convair 240 and 340 series; Martin 202's and 404's—as well as on other famed Lockheed Constellations.*

FACILITIES + ABILITIES = EXTRA *plus* IN

**ZENITH skill produces
world's largest radomes
for Lockheed "Sentinels
of the Air"**



The huge radomes above and below the Lockheed Super-Constellation, and the novel anti-icing radomes in the nose, are products of Zenith's specialized technique and skill in reinforced plastics combined with electronics. These are the giant radomes which provide 360-degree "eyes and ears" for the U. S. Navy and Air Force, scouting for beyond the borders of the United States for early warning of enemy attack. Zenith's unique background of experience in this highly specialized field is available on contract with Engineering Department—

ZENITH PLASTICS CO. Z Gardena, Calif.

FIRST

OF THE

Sapphire

LINE OF NARCO PRODUCTS

narco

Positive, continuous indication of position is now a reality with the YOR/DME system, greatly simplifying navigation for solar, cruise, faster, more positive, more economical flight operations.

To implement this final link in CAA's common system of YOR navigation, Narco introduces its Model UDI-1 Distance Measuring Equipment for commercial and corporate aircraft use.

Perfected after years of exhaustive development under CAA/ANDB sponsorship, this new Narco DME is built to full air transport standards and has many exclusive features such as crystal-tuning.

This fine, new airline tested DME, introduces Narco's new Sapphire line of navigation and communications equipment designed to the highest possible electronic standards unsurpassed for reliability and performance.

**choose *NARCO* DME for
these superior points...**

- Exclusive crystal tuning
- Unified construction for efficient servicing
- Backed by a nationwide network of especially-equipped DME service centers



Working less than 20 pounds, Narco DME equipment consists of a driver, and operates on a standard 14-270 volt, 1 phase electrical line, and ground mounting equipment which indicates distance in one range 0-100 miles and 0-20 miles.



narco

NATIONAL AERONAUTICAL CORP.
Ephrata, Pennsylvania

Functional
Design

an **ADVANCE
RELAY**
for every
application



INDUSTRIAL...

Designed for use in commercial and industrial applications, Advance relays offer a complete line of rugged, precision-built relays for your specific needs.



COMMUNICATIONS...

Designed for use in communications systems, Advance relays offer a complete line of rugged, precision-built relays for your specific needs.



ELECTRONIC...

Designed for use in electronic systems, Advance relays offer a complete line of rugged, precision-built relays for your specific needs.



AIRCRAFT...

Designed for use in aircraft systems, Advance relays offer a complete line of rugged, precision-built relays for your specific needs.



**ADVANCE
ELECTRIC &
RELAY COMPANY**

340 NORTON ROAD, ST. BERNARD, CALIFORNIA

Aviation Week

February 1, 1954

Editorial Office

New York 24—110 W. 42nd St., Tel. JOerges 4-3800
Washington 4, D. C.—National Press Bldg., Tel. NAtionals 2-3414
Los Angeles 10, Calif.—1111 Wilshire Blvd., Tel. MEdison 4-1223

Vol. 40, No. 2

Table of Contents on Page 8

30,000 copies of this issue printed

Robert W. Martin, Jr.

Publisher

Robert H. Wood

Editor

Robert E. Hite

Executive Editor

Merlin H. Medel

Managing Editor

Allen W. Davis

David A. Anderson

Irving Stone

G. B. Gurney

Katherine Johnson

Les Moon

Philip Klare

Ernest J. Sedore

Richard Schickel

News Editor

Engineering

Technical

Equipment, Maintenance

Compos

Transport

Airwaves

Special Assignments

Foreign Agencies

Frank Shea, Jr.

William J. Coughlin

Boris Ling

Henry Loh

Charles C. Conley

G. J. McAllister

Lawrence F. Herb

Victor Gossif

Lee T. Tarpy

Special Assignments

West Coast

West Coast Assistant

News Desk

News Desk

Washington News Desk

Art Editor

Editorial Mailbag

Printing & Production

DOMESTIC NEWS BUREAUS

Atlanta 13

Chicago 12

Cleveland 25

Detroit 1

1125 Rhodes-Henry Bldg.

519 N. Michigan Ave.

1515 Shuman Bldg.

275 Peachtree Bldg.

Houston 28

Los Angeles 37

San Francisco 4

Washington 4

1301 Piedmont Bldg.

1018 Wilshire Bldg.

61 Post St.

3199 National Press Bldg.

FOREIGN NEWS SERVICE

Editor Joseph E. Van Dorn, Jr.

London 10

Paris 10

Frankfurt 10

Amsterdam 10

Brussels 10

Geneva 10

Madrid 10

Rome 10

Stockholm 10

Warsaw 10

Zurich 10

Merlin H. Medel

London 10

Paris 10

Frankfurt 10

Amsterdam 10

Brussels 10

Geneva 10

Madrid 10

Rome 10

Stockholm 10

Warsaw 10

Zurich 10

Per Lee

Industry Relations

Research and Marketing Conference March, Denver, June Gruber, June Muller and Mary DeWitt, Amherst.

J. G. Johnson

Business Manager

Sales Representatives: J. C. Anthony, New York; H. F. Johnson, Cleveland; D. T. Brennan and J. E. Condit, Chicago; and St. Louis; E. F. Blackford, Jr., Boston; James Cash, Dallas; Robert H. Sells, Atlanta; B. E. DeWitt, San Francisco; C. R. McKeown, Los Angeles; W. S. Henry, Philadelphia; C. A. Randall, Detroit. Other sales offices in Pittsburgh, London.



AVIATION WEEK • February 1, 1954 • Vol. 40, No. 2

Member AIP and AEC



Published weekly by National Aeronautics Association, 1200 K Street, N.W., Washington, D.C. 20004. Founder: John H. Mears. Editor: Robert W. Martin, Jr. Publisher: Robert H. Wood. Managing Editor: Merlin H. Medel. Executive Editor: Robert E. Hite. News Editor: Allen W. Davis. Engineering Editor: David A. Anderson. Technical Editor: Irving Stone. Equipment, Maintenance Editor: G. B. Gurney. Composition Editor: Katherine Johnson. Transport Editor: Les Moon. Airwaves Editor: Philip Klare. Special Assignments Editor: Ernest J. Sedore. Foreign Agencies Editor: Richard Schickel. Advertising Manager: J. G. Johnson. Business Manager: J. G. Johnson. Sales Representatives: J. C. Anthony, New York; H. F. Johnson, Cleveland; D. T. Brennan and J. E. Condit, Chicago; and St. Louis; E. F. Blackford, Jr., Boston; James Cash, Dallas; Robert H. Sells, Atlanta; B. E. DeWitt, San Francisco; C. R. McKeown, Los Angeles; W. S. Henry, Philadelphia; C. A. Randall, Detroit. Other sales offices in Pittsburgh, London.

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD



New Faster Fury Jet Joins Navy Air Team

Latest addition to North American's FJ series of Navy fighter aircraft will be the new FJ-3 Fury Jet, now in production. Powered by the Wright J-45 Sapphire jet engine, the FJ-3 is in the high subsonic speed class with faster rate of climb. Fitted with an improved Navy gun-sight and heavily armed, the Fury has a lethal punch rivaling any Navy carrier-based fighter.

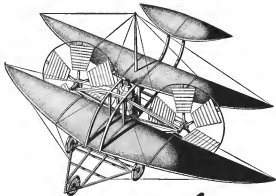
See going into the battle-proven Sabre, the new FJ-3 Fury is another example of North American's engineering vision and ability in designing and building versatile... practical airplanes to protect our security everywhere.



Specialized and built by North American for carrier authority was fitted in an electric motor. The engine, of Edward Heinemann, was built in the Navy's aircraft engine plant, and was built in the Navy's aircraft engine plant, and was built in the Navy's aircraft engine plant.

organization, facilities and experience keep
North American Aviation just ahead
in aircraft... guided missiles... electronics...
atomic energy... research and development





Domestic

Northrop Aircraft has set up a weapons systems analysis department at its Hawthorne (Calif.) plant to research electronic "in the box" possible weapons, predict effectiveness and capabilities and offer suggestions on mission use. Director of the new department, Herbert K. Wynn, former chief of Ansa's weapons systems laboratory at the Aberdeen, Md., proving ground.

Deallac is soliciting comments on CAA's proposed conversion of speed and distance measurements to knots and vertical miles has been extended to Feb. 1. Examination of rules per hour and statute miles was requested by Air Transport Union and Air Line Pilot Assn., representing more than 90% of all revenue traffic under instrument flight rules.

Northeast Airlines has bought four Cessna 240s from Tex. American World Airways plans to use the twin engine transports to double service on New England routes this spring. Price tag on each 240 \$108,000.

DC-4 flight simulator, developed by Transwestern Air Lines has been certified by CAA.

California Eastern Airways has ordered approximately 90 de Havilland Canada DHC-6 Twin Otter turboprop aircraft, expects to continue operations after the contract expires Mar. 31 if several terms are negotiated successfully. The carrier planned to dispose of all flight equipment and its Oakland, Calif., maintenance base after USAF moved down CIA's mail but left November.

Edwin A. Link, board chairman of Link Aviation, has established the Link Foundation at Bloomington, N. Y., to advance training and education in aeronautics.

Bell Aircraft Corp. has sold three Model 47C helicopters to the Spanish navy, believed to be the first rotary wing aircraft purchased by that country. Bell will train three Spanish pilots and mechanics this month at Ft. Worth, expects to deliver the copters at Madrid in March.

Lightship bulletin reported 479 aircraft valued at \$4,649,876 decelerated 1913 compared with 194 at \$1,946,729 the previous year. Aircraft Industries Assn. report. December deliveries totaled 41 planes valued at \$534,728.



Grumman Cougars Prowl the Skies

First picture of a formation of six Grumman Cougars to be released by the Navy shows four Alaska-registered PW-119s over Virginia. The Cougar is the first wingtip-to-wingtip in operation service with the Navy. Later ships, powered by PW-119A (4), are designated PW-6. The Cougar, noted in the upcoming class ocean all fuel intensity. Some models are used for high-speed photo reconnaissance.

Scandinavian Airlines System, leaving the last of its 14 plane DC-6B fleet from Los Angeles to Stockholm. SAS president Torbjørn H. Nansen says the carrier now is in a position to begin coast-to-coast flights over the proposed 6,900 nautical miles May 1 if Scandinavian was commercial permits in negotiations with the U. S. and Canada.

N. W. Bosley, 46, assistant chief engineer of Convair's San Diego Division, died Jan. 23 at Natley, N. J.

Albert H. Wesell, 70, retired CAA district engineer at New Cumberland, Pa., was killed last week when an airline plane in which he was being flown to New York following a stroke crashed near San Diego. Two others died in the accident.

Charles E. Wilk, Jr., assistant aide to Presidential assistant Barbara Adams, has married Elizabeth Fierstone, daughter of Harvey Fierstone, Jr.

Financial

Ryan Aeronautical Co., San Diego has declared a regular quarterly dividend of 10 cents per share on common capital stock, payable Mar. 12 to stockholders of record Feb. 19.

International

Police air units have been explored for the first time in more than a year by

Swiss DC-6B has flown the 501 mi. London-Zurich route in a record 85 min., dipping 5 min. off the previous best time of a piston-powered transport and falling short by only 7 min. of the mark set by a de Havilland jet Comet 2 last September (Aeronews Week Oct. 12, p. 116).

Canada's aircraft industry delivered nearly 1,200 military planes to U. S., Britain and Germany in 1963 last year at a cost of approximately \$100 million, Air Industries and Transport Assn. report. Contractors received more than \$21 million in orders from Department of Defense Production for aircraft parts, equipment and overhaul work.

Pakistan International will remove its last airplane, a Super Constellation, at Lockheed Aircraft Corp.'s Burbank, Calif., plant Feb. 1. Pakistan's U. S. ambassador will take delivery on behalf of the new airline.

... out of this came Aviation

...a precision industry

To serve this great industry a manufacturer must maintain the best and most modern equipment available, operate it with skilled craftsmen, and use every existing method of tightening specifications and cutting production costs. Indiana Gear is such a manufacturer—a company of craftsmen producing fine quality transmitters and actuators for industry.



INDIANA GEAR

INDIANA GEAR WORKS, INC. • INDIANAPOLIS 7, INDIANA



This is the control panel room in B-57's after action line testing department—done at the contributing factors in Indiana Gear's unique ability to create head for mile paths to meeting specifications.

has been around
(and still is!)



True Trail was developed in 1947 to achieve true take in the prototype Grumman A-600. This aircraft proved to be rugged in the new amphibian, functioning perfectly despite prolonged exposure to salt water. Soon afterward, McDonnell selected True Trail for the original A-600. It has been used in every model of the series.

The same basic model continues to satisfy all demands, although aircraft design has changed radically. True Trail is now specified equipment in the Chance-Vought Cyclone, the Douglas Skunkwing and A-10.

Meeting the requirements of MIL-A-8065 (USAF) it weighs 315 lb., has ultimate stress capacity of 2000 lb., and produces 380 hp in operating torque through 240 degrees.

The story of True Trail is only one example of Aeronaut's pioneering in the aviation field. As the evolution of aircraft design poses new problems, look to Aeronaut for the solutions. For more information on True Trail, and other aircraft, see our literature in the IAS Catalog.



Accessories Corporation

PHILADELPHIA • NEW JERSEY

The Aviation Week

February 1, 1954

Headline News

- Air Building to Build Process Done... 21
- NACA Aids Over \$25.6 Million... 21
- Coastal Not Expected to Fight CAS... 21
- Land-Attack Recovery Features... 21
- Defense Acts in Security Handle... 21
- Security Chart of AF Airports... 21
- Factor Security Battle... 21
- CAR Aids B-24, L-4... 21
- Comet 2 Tests... 21
- Jetliners... 21
- Comet 2B First Test... 21
- Infantry Ground Support... 21
- Civil Plane Sales Grow... 21
- Navy Tests Vought... 21

Aeronautical Engineering

- Aircraft Pitches Upper-Air Refuelers... 21

Production

- How to Get and Build Your Engineers... 21

Avionics

- New Jobs for Digital Computers... 21

Financial

- Aircraft Stocks Make New Gains... 21

Equipment

- Driver Gets Bright Light System... 21

Air Transport

- P.O. Aids More Tests in Mail Transport... 21
- DC-7s... 21
- CAR... 21
- Copier... 21

Editorial

- Brooks in Aircraft Pay... 21

Departments

- News Digest... 21
- Picture Page... 21
- Where's Waldo?... 21
- Industry Observer... 21
- What's a Dog?... 21
- Book Reviews... 21
- Editor's Corner... 21
- On the Line... 21
- New Aviation Products... 21
- Also on the Market... 21
- Security Personnel... 21
- Aviation Calendar... 21

Picture Credits

Boeing...
Lockheed...
Douglas...
Grumman...



the **ARC**
Portable
COMMUNICATOR



TYPE 12
VHF 118-148 MC

Here's the answer to a need of both military and civilian aviation and other industries as well—a two-way VHF radio communication set that is easily portable, requiring only the addition of a 24 volt dc power source. Both transmitter and receiver combined, packed in a handy carrying case, weighs only 37 lbs.

With outstanding antenna, it can be set up quickly anywhere. Principal uses are for ground or shipboard communication with aircraft. It is useful also in oil and mining operations for either ground-to-plane or ground-to-ground communication over rough terrain. The assembly consists of the R-19 VHF Receiver and a choice of the T-118 or T-11A VHF Transmitter—all widely used by Army, Navy and Air Force. Dimensions: 10" x 10" x 10". Weighs with antenna at 3800 to 3900 lbs. and ground antenna at 25 lbs.

Set of man in 10" by 10" by 10" inches. Lightweight and low cost. Write for complete details.

Dependable Aircraft
Equipment
Since 1938

Aircraft Radio Corporation
BOSTON NEW JERSEY



RELI DELIVERS FIRST HSL—Navy Bell HSL-1 has been 700 mi. from Ft. Worth, Tex., to Fifth AFH, Fla., for extensive climatic tests. First view of fleet of the big system shift simultaneously shown: (right) Still with ventral fin.

New Aircraft Start Tests



FRENCH TEST NEW RESEARCH PLANE—Simons 1400 Gertie, which made its first flight Jan. 15, in new delta wing form, lightly loaded wing. Weighing approximately 6,000 lb., the 1402 is powered by a C-7000 diesel Atom BEC and four turboprops.



S.B. 5 ENTERS NEW TEST PHASE—Short Run supersonic research plane now in flight with horizontal tail mounted below fuselage. Previously it had been placed atop the fus. Note ground-adjustable landing gear which can rotate upward to the fuselage.

4 major developments in TEMCO's rapid growth



PRODUCTION — TEMCO early built a reputation for extreme production of high quality, on schedule, at lowest possible cost. In its Dallas and Greenville plants, TEMCO is producing major components for Martin, Lockheed, Consolidated, Bend, McDonnell and Boeing. One recent subcontract is Boeing B-70 Strategic Air Command, shown above.



BASIC DESIGN — In recent years, TEMCO has placed additional emphasis on new design of its own. New military aircraft such as the Model 33 FUEB trainer, shown above, now being evaluated by the U. S. Navy of Pensacola, Florida, are evidence of the company's development policy.



OVERHAUL — Another major TEMCO activity has been aircraft overhaul and modification for the armed services. Today, assembly-line rehabilitation of multi-engine aircraft is an important, growing service both at the Dallas and Greenville plants. A current project at the Greenville plant is the Air Force C-97 Hercules ship conversion, illustrated above.



RESEARCH AND DEVELOPMENT — TEMCO's expanded engineering staff is working on many new military aircraft projects of advanced scope. Modern facilities, such as the well-equipped engineering research laboratory above, help TEMCO design solve complex military aircraft design problems.



Plants at: DALLAS • GARLAND • GREENVILLE

WHO'S WHERE

In the Front Office

Thorne Gaudin, Assistant to the Secretary of the Air Force, has moved to his new position at Hyman Manufacturing Co.—Pawtucket, R.I., because of increased personal responsibilities. Thorne Gaudin has been elected to succeed Gaudin as vice president and Alvin E. Adler is now president. Other changes: E. S. Marston, secretary-treasurer; Glenn C. Jolly, vice president.

Jack Clark, former test pilot for Lockheed Aircraft Corp. and Boeing Airplane Co., has become vice president-designer for Thorne Electric Engineering Co., San Francisco, Calif.

E. B. Gaudin has been appointed vice president general manager of Allied Industries, Allied Engineering Division, South Norwalk, Conn.

Robert L. Baker is now treasurer of Transcon Air Lines.

Changes

Bernett H. Hoshko, former assistant president of General Electric, recently was promoted to the Institute of the Aero-control Sciences, has been appointed general manager of Applied Hydraulics Inc. in Detroit, Michigan, Inc., Cleveland.

Frank J. Maclean has become assistant vice president of Air Transport Association. Also, Carlos M. Edder (TSA) Inc., Naval Air Station, recently joined its own company of development for General Tire & Rubber Co., Akron.

S. W. Ross has been promoted to chief manufacturing engineer at Lockheed Aircraft Corp.'s Georgia Division. Other appointments: J. A. Thompson, director of parts and services for the California Division; W. A. Fisher, chief test engineer; H. D. McKenna, Factory C, main manager.

Louis J. Gaudin is now public relations director for Pan American Aircraft Services, Buffalo, N. Y.

Frederic E. Schaefer has been appointed assistant chief engineer for General Motors. Also promoted: J. M. Schaefer, chief design engineer; R. D. Richmond, chief development engineer; E. J. Knappe, chief marketing engineer; F. J. Wilber, chief test and power engineer; R. B. Higgins, chief project engineer; E. A. Harter, chief engineer; H. B. Whitman, assistant project engineer; and S. J. Pope, sales chief for salesmen.

Joseph E. Harter is now manager of special operations for American Airlines. Walter J. Gaudin, Jr., has become chief of mechanical engineering for Miller Metal Products Engineering Research Division, Baltimore.

Honors and Elections

Dr. Irvin A. Gelling, vice president of engineering and research for Raytheon Manufacturing Co., Waltham, Mass., has been named chairman of the Electronics and Communications Panel of USAF Scientific Advisory Board.

(Continued on page 64)

INDUSTRY OBSERVER

Defense Secretary Charles K. Wilson reports that, with a "low acceptance," the aircraft industry has done a good job in meeting its aircraft delivery schedule during 1951.

Test pilots who flew from the Convair TP-102 following all-weather emergency at Edwards AFB report it has "excellent" speed, stability and control characteristics up to Mach .95, the maximum speed reached so far despite previous reports of stability problems associated with the plane. USAF chase pilots observing the TP-102 flights from an F-86 concern in the stability and control reports of Convair pilots Sam Shawano and Thad Johnson.

Newly formed Electronics Division of the American Car and Foundry Co. is believed to be planning acquisition of a Navo "Project Tinkerton" type electronic system for producing vehicle and electronic equipment. Director of the new ACF agency is Alexander, Va., is Electronics Division that developed Tinkerton.

Bell Aircraft Corp. board chairman Larry Bell publicly confirmed Aviation Week's story on the difficulties encountered by Maj. Charles Yeager in his record Mach 2.5 flight in the Bell X-1A (Aviation Week: Dec. 24, 1951, p. 15). Bell said Yeager cut his power during the descent to 70,000 ft. and because of the critical atmosphere had no control of the X-1A without power. Bell said the X-1A tumbled forward and rebounded for several thousand feet before responding to the controls. Yeager was knocked unconscious in the cockpit and his parachute had smashed the rear glass of the cockpit's sealed cockpit canopy, according to Bell.

Ryan's new model-5000 contract for rocket engines will provide power for the Army's Chaparral E rocket-powered high-altitude missile now being built by Firestone Rubber Co.

Pitt & Whitely Aircraft engines were powering 80% of the U. S. domestic commercial fleet at the end of 1951. More than 3,200 engines are installed in airline planes, a gain of 100 over 1950.

Air Force expects to sign a firm contract with Pan American Airways and Radio Corporation of America to develop the project of the project in the Caribbean. Negotiations were begun last summer but have been stalled at the Defense Department level. In the interim, cruise test program has been seriously retarded by lack of adequate facilities to run the down range, down-galvanizing instruments.

USAF has a powerplant development program aimed at bringing along four big turbojet engines to succeed the Pratt & Whitney J57. Allison, Curtiss-Wright, General Electric and GEWA are well along on jobs aimed at producing 35,000 in thrust with afterburners.

Convair expects to fly its first Allison T56-powered Convair Laser only this spring, probably in May.

American Airlines has been testing a new old warning device on a Convair Laser. The system, developed to compensate for the lack of a Gaudin Co. flight warning signals in the cockpit to alert pilot and co-pilot that a stall is under way. AA engineers say one of the major advantages of this type of device is that it allows the pilot to keep complete control over plane's banking system. The test installation also has helped show pilots some flaws in their banking technique.

Boeing Aircraft Engine Co.'s Model 104 helicopter currently is undergoing ground and flight tests necessary for CAA approval. Cash has small swept wings and pusher propeller pushing with anti-torque rotor to improve forward-flight performance. First flight was last October.

North American F-100A has been modified without installing shorter radius of increased chord. Base of tail is stretched about half-inch longer. Original tail design of the TP-102 had tail, semi-circular shape design.

Air Buildup to Continue at Present Level

- Proposed fiscal '55 budget assures aircraft industry of peak production rate through next two years.
- Actual spending will increase to more than \$9 billion annually; backlog in '56 expected to total \$17 billion.

By Robert Hoot

The aircraft manufacturing industry has looked forward to at least another two years of business at its current level. This is the significance of the approved portions of the fiscal 1955 federal budget set out here by Congress.

Expenditures for military aircraft and related procurement are the key to current business plans, while new appropriations are the guide to future production levels.

■ **Increased Schedule.**—Top Defense Department spokesmen say expenditures for aircraft will remain at about the current level until June 30, 1955, while spending for missiles and guided missiles will continue to increase.

Official Defense Department figures show that actual spending for aircraft, guided missiles and industrial mobilization is scheduled to increase during fiscal 1954 to \$9.1 billion and hold at \$9.1 billion for fiscal 1955. Of these totals \$3.4 billion will be spent on aircraft alone during fiscal 1954 and \$3.5 billion during fiscal 1955. This compares with \$2.5 billion spent on aircraft in fiscal 1953 and \$4.3 billion in fiscal 1952.

Production of military aircraft will continue at its current rate of 900-1,000 per month until early in 1956, but aircraft weight will continue to increase during 1954 as a larger volume of heavy transports and jet bombers is delivered. Airframe weight will dip slightly during fiscal 1955 but soon rise higher than in fiscal 1953.

■ **\$20-Billion Backlog.**—The aircraft industry is scheduled to enter fiscal 1955 with a backlog of \$17 billion in military orders representing about 70,000 unfilled aircraft. This compares with a current backlog of about \$10 billion.

For the future beyond 1956 the fiscal 1955 budget gives a rough idea of what the aircraft industry will spend after coming out of the post-Korean lull. New appropriations of \$7.5 billion have been requested for aircraft and related procurement to which must be added approximately \$1.8 billion available in unobligated Air Force government

funds to be carried over from fiscal 1954.

This will provide a total of \$6.5 billion for new aircraft contracts during fiscal 1955. Since all funds required for the Air Force expansion to 137 wings have been appropriated in prior years, the fiscal 1955 program is expected in pretty close to the maintenance and modernization rate required to keep USAF and Naval Aviation at their authorized maximum strength.

■ **\$6-Billion Level.**—Spent at \$7.7 billion is scheduled to be consumed in new aircraft contracts by USAF and Navy during fiscal 1954. This compares with \$12.6 billion contracted for in fiscal 1953. Thus it appears that military aircraft procurement eventually will settle down to about a \$6-billion annual level, which is about half of the post-Korean mobilization peak and more than three times the level of the pre-Korean procurement level of fiscal 1950.

While the total inventory of military aircraft is scheduled to increase from 33,000 to 48,000 during the next three years, the active inventory is scheduled to rise from 14,150 planes at the end

of the current fiscal year to 35,540 at the end of fiscal 1955.

This includes an increase of USAF active inventory from 21,000 planes to 22,000 during fiscal 1955, with about 16,000 planes assigned to active units, and a decrease in the Navy active inventory from 13,150 planes to 12,800 planes for the same period. Number of Navy planes assigned to active units will remain at 6,942. Marine air strength will remain at three units, included in the total of Navy aircraft.

■ **Active Expenditures.**—USAF equipment will reach a total of 115 fully equipped combat wings at the end of fiscal 1954 and 120 fully equipped wings by the end of fiscal 1955. Target for service the 11th wing still is the middle of 1957.

No new procurement requests were made for fiscal 1955 at military facilities because of a cut-back of approximately \$10 billion in unexpended fiscal 1954 funds as a result of the end of the Korean war. Active is scheduled to spend about \$1.2 billion more than fiscal 1953, compared with \$50 million during 1954 and \$95 million in fiscal 1953.

Aircraft expenditures will count for 23% of the Defense Department total during the post-war years. Fiscal 1953, compared with 28% during the current fiscal year, 17% in 1951 and 11% in 1952.

■ **More Fraying.**—In addition to the current appropriations schedule is guided

missile and aircraft buying, USAF has requested \$461 million for new procurement of jetted electronic equipment, navigational aids, aircraft control and warning systems, tested air control systems and special airborne radar and radio equipment not installed at aircraft factories.

Both USAF and the Navy have requested increases in their aircraft maintenance and operations budgets, reflecting a higher level of flying activity programs during fiscal 1955. Navy's request was boosted from \$94.5 million in fiscal 1954 to \$97.1 million for fiscal 1955. USAF is asking an increase from \$3,155 million in 1954 to \$3,155 million in 1955.

More Air Defense

Defense Secretary Charles E. Wilson at a press conference confirmed earlier Aviation Week reports that the 137-wing USAF program contained the same number of combat wings as the 145-wing program and differed only in a cut of an troop carrier wings.

USAF Chief of Staff Nathan S. Twining told the press conference that the combat strength of the 137-wing Air Force reflected an increase in emphasis on air defense with three additional air fighter wings and five additional all-weather interceptor wings. Strategic Air Command had been reduced from two B-47 wings and troop carrier wings were cut from 37 to 11 wings.

■ **Delays Acknowledged.**—USAF Secretary Harold B. Talbot said that as significant aircraft production had been delayed during the post-war years as a result of USAF program disorganization, but admitted there had been delay and dipper in the active construction program.

Other highlights of the conference: ■ USAF plans to increase its pilot training rate from 7,200 annually to 7,500 during the current fiscal year. By the time the 137-wing program is at full strength in 1957, USAF plans to have 50,000 pilots in the pipeline.

■ Wilson expects USAF to get an increasingly larger share of the Defense Department budget in fiscal 1956 and 1957, remaining one of the current Republican Administration. He said USAF got 40% of the new obligations asked by Defense Department for fiscal 1955.

■ USAF will ask for a billion-dollar peak in active inventory in addition to the \$12-billion budget request submitted.

Wilson said he believed the current military aircraft production program would cover the first and longest cycle for the aircraft industry and maintain an adequate aircraft production level in being, as well as a good mobilization base to support the strength of Naval Aviation and USAF.

■ **Schedules Improve.**—"I don't believe

NACA Research Program

The following table shows funds expended by the National Advisory Committee for Aeronautics in fiscal 1953 and 1954 and the amount of new money requested for 1955:

Program	1953	1954	1955
		(800 contract)	
Aerodynamic research	\$24,756	\$24,382	\$27,293
Propulsion research	15,126	7,143	15,793
Aircraft structural research	5,981	6,778	8,183
Operation problems research	1,812	1,915	2,081
High-speed research	2,520	2,520	2,520
Total	\$40,435	\$50,600	\$55,600

NACA Asks \$53.6 Million for '55

National Advisory Committee for Aeronautics has requested a \$53.6-million budget increase for fiscal 1955 over the current year.

Bulk of the increased funds requested to be expended on research and aircraft structural research. NACA requests total \$53.6 million compared with \$50 million allocated for fiscal 1954.

New construction totaling \$4,620,000 is added for the following projects: ■ **Altitude of two existing windtunnels**

at Ames (Gold) Laboratory to increase high-speed capabilities.

■ **A new facility at Langley** (Langley) Laboratory for research in landing and takeoff characteristics of airplane engines.

■ **React engine test facility** at Lewis (Lewis) Laboratory.

■ **Altitude in an existing windtunnel** at Lewis Laboratory to increase air speed range.

■ **Additional on-handling equipment** for engine research facilities at Lewis.

new funds in the aviation industry for working to have an extra year's business on their books. "When said, 'We are not determined that we won't order planes to be placed in the future. Only 180 planes were actually canceled last year. The rest were just deferred for another year.'"

"I happen to have a good job about last time and when I asked the aircraft people to let them their didn't attempt to expand too much on the facts because they knew I knew something about it. I was told that they were using schedules and if there was any reason they couldn't meet their schedules I wanted to know about it and make new schedules. They had a job to do and to meeting their schedules this year."

Godfrey Not Expected To Fight CAA Action

TV star Arthur Godfrey last week was not expected to contest Civil Aeronautics Administration's charges of "fraudulent" operation of his DC-3 in a telecast from Teterboro, N. J., August Jan. 7.

Godfrey had said Jan. 30 to answer CAA's charges filed with Civil Aeronautics Board. Four charges filed with the Board by CAA's 9th Region claimed Godfrey: ■ Took off from Teterboro without conforming to the traffic pattern.

■ Piloted the DC-3 in such proximity

to other aircraft and the airport's control tower to create a collision hazard.

■ Did not have the proper radio certificate to fly the aircraft.

■ Fled the transport as a "madman escape."

CAA said that Godfrey's pilot certificate had expired. "Each year of the Board's term in the public interest" and not until he receives a CAA medical certificate.

■ **Talbot.**—William Godfrey claims he was caught in a "bad situation on island." On a radio broadcast from Miami, Fla., shortly after Port of New York Authority revealed it would seek suspension of his license, Godfrey explained that after years of being he was not about to pull any tricks.

Godfrey was taking off in a stiff crowd blowing from the direction of the tower across the runway he was using.

Godfrey's DC-3 was modified late last year to take PAWA R2000 engines of 1,050 horsepower. It is now only half as fast as the modified 1,200-hp PAWA R1550-R2s. It is the first privately owned DC-3 to have R2000s installed.

■ **Creditable Technology.**—CAA's charge

Military Aircraft Expenditures

	Fiscal 1953	Fiscal 1954	Fiscal 1955
		(900,000 omitted)	
USAF	\$5,586	\$6,500	\$6,700
Navy	1,715	2,490	2,490
Total	\$7,321	\$9,300	\$9,180

New Aircraft Contracts

	USAF	Navy	Total
	\$6,300	\$2,700	\$4,527
	\$3,315	1,860	2,980
Total	\$12,421	\$7,790	\$16,907

Backlog of Unexpended Funds

	USAF	Navy	Total
	\$16,566	\$13,970	\$12,717
	8,447	6,270	5,787
Total	\$25,413	\$20,220	\$45,904

Source: Federal Budget

that he did not have the proper right of copyright appears to be a technicality. The agency has no record of Godfrey's model's certificate since 1949. The law requires that physical evidence be taken every five years.

Godfrey does hold a patent. Non-physical evidence, but the proper papers never were sent to the CAA. Since the telephone incident, CAA has received a medical examination signed by a New York doctor made on Godfrey Dec. 15. If accepted, this medical probably would cause the model's change to be dropped automatically.

Lindbergh Receives Pioneer Flight Award

"Long term service depends upon the character of men," Charles A. Lindbergh told the 12th Annual Boston Night Dinner of the Institute of the Aeronautical Sciences last week.

Lindbergh, making a rare public appearance, philosophized an award in an audience composed of the U.S. and 100,000, comprised of the Institute of the Aeronautical Sciences last week.

"I am proud to receive this award," Lindbergh said, "for the service of the United States and the country of our American people. This recognition is a great honor, standing on among the highest honors but less than the problems."

IAS Awards—Lindbergh received the Thayer Guggenheim Medal, awarded annually by representatives of three aeronautical societies for "distinguished service in flight and air navigation."

Other awards were made during the annual meeting (November 14-15, 1954) at the Capt. C. F. Hall (DME) USSN, Jerry T. Harrison, Jr., United Air Lines, Ernest G. Street, General, and Dr. Donald Cook, California Institute of Technology.

Fellowship—History Knowledge was presented to Captain B. B. Bowers, president of Sperry Gyroscope Co., and Dr. William Farrow, technical director of A. V. Roe and Co., Ltd.

Fellow elected for 1955: Milton G. Bress, chief engineer of American Airlines, L. F. Connelley, chief of aircraft research for Aeronautical Research Labs, Australia; Fred N. Decker, chief engineer of General Electric Aircraft, E. M. Fowles, vice president-engineering of Curtiss-Wright Corp., Fred W. Pratt, chief engineer of WPAVA Division of United Aircraft, Norbert E. Rorer, technical director of Lockheed & General Aircraft, Ltd., England; Clarence R. Ryan, director of Civilian Aircraft, E. E. Seidler, president of aerodynamics, California Institute of Technology; E. C. Wells, vice president-engineering, Boeing Aircraft Co.; Carlos Wood, chief pattern design engineer, Santa Monica plant, Douglas Aircraft Co., Inc.

Defense Acts in Security Hassle

Senate recommends Navy censorship changes; USAF spells out new classification responsibilities.

Recommendations to change security classification provisions of Navy's new security codebook (Aviation Week, Jan. 18, p. 17, Jan. 23, p. 15) now transmitted last week by Assistant Defense Secretary Fred A. Seaton to Navy Secretary Robert B. Anderson.

Meanwhile, Air Force issued a regulation (AFS-97) defining policy and procedures for assignment and designation of security classifications to USAF aircraft and aircraft engines.

Since the Senate recommendations of Navy security codebook changes, the Department of Defense will be a subordinate action, regulation appears certain.

Defense Policy—Historical Secretary of Defense's Office of Public Information, directed to avoid specific details of the changes recommended, but they will bring the Bureau of Aeronautics' instructions in line with Defense Department policies.

Defense officials were unable to estimate when the revised directive will be sent to Navy contractors and field installations.

USAFA's new regulation, which supersedes AFPS-24 and 285.20, Air Research and Development Command specified as responsible for the security of such items throughout the

period during which the article is being designed and the initial quantity of test items is being produced and designed.

Air Material Command took over classification authority after a decision was made to produce the article in quantity for training purposes and the development tests and will supply.

Applications—The classification chart applies to USAF printed aircraft, pilot and aircraft support aircraft, aircraft support and ground support aircraft. The chart does not apply to other wing, training, liaison, supply, and rescue, cargo and glider types of aircraft. Initial security classification of such aircraft will be made by plant contractors, USAF, upon recommendation of the contractor having security in theory.

However, it will not be permitted items to new or newly modified aircraft or aircraft engines or information concerning them to contractors of the security classification being considered. Initial release of information will be made only upon the approval of the Chief of Public Information, Office of the Secretary of Air Force. Plans for release rest with the Office of the Secretary of Defense.

Security Phases—There are four security phases of development and production for aircraft:

1. Preliminary design studies and Phase 1 contracts through tasking.
2. Phase 2 contracts from tasking until delivery of the first production aircraft.
3. Factory follow-up until operational units are receiving the first production aircraft.
4. After operational units are receiving production aircraft.

Similarly, there are four security phases of development and production for aircraft engines:

1. Design, design, including drafting of specifications and preparation of drawings and data.
2. Date of completion of first "X" engine for final failure test.
3. Date of acceptance of 50th qualification test or equivalent.
4. Date of acceptance of 100th qualification test or equivalent.

Classification—The new security phases of development and production for aircraft engines:

1. Design, design, including drafting of specifications and preparation of drawings and data.
2. Date of completion of first "X" engine for final failure test.
3. Date of acceptance of 50th qualification test or equivalent.
4. Date of acceptance of 100th qualification test or equivalent.

Lufthansa Misses First 340 Delivery

Lufthansa, the proposed German airline, missed delivery of its first Concorde 340 last week because the Federal Republic's Boarding has not notified the Allied force treaty. The airplane was sold to United Caribbe and Caribbe Corp.

The airline has lost 340 on order. But said the treaty has been notified to Bonn, it cannot operate north.

BuAer Security Result: Confusion

Aircraft industry says directive indicates haphazard classification, multiplies paper work and expense.

Los Angeles—U. S. Navy's latest directive on security classification was raising as much confusion as the aircraft industry last week that some industry officials found it might undermine the security efforts.

In addition to its attack on press freedom (Aviation Week, Jan. 18, p. 15), Bureau of Aeronautics Instruction 001.19 also outlined the Navy's new order for handling of classified information.

Information Upgrade—Following President Eisenhower's order classifying the security classification of Restricted, extensive upgrading of information to Confidential by both Air Force and Navy was reported by industry sources.

"It's a loss to the staff doing cabinet industry," a Los Angeles official said. "Large numbers of documents which are presently handled as Restricted material must now be handled as Confidential."

Enter Steps—While the President's order was issued, the industry officials reported only a comparatively small amount of Restricted material now was being reclassified.

It appeared that more reliable officials intended to take the responsibility of reviewing the Restricted label on information, were taking the major step of upgrading it.

The conflict has been to expand the Confidential classification to cover both of the former categories of Confidential and Restricted, said an executive who is responsible for handling of classified information at one of the nation's largest aircraft plants.

In addition, the restrictions the new Navy directive places on confidential information have the effect of creating a new security category.

Compromised Guidelines—One subcontractor reported the expense and confusion had been compounded by a Navy ruling that all and private who received documents needed Restricted now must be notified that they had been upgraded to Confidential. If such were the case.

"It's wrapped with the paperwork," he lamented.

The danger of mass over-classification of information was pointed out by one official, who commented: "There is no better way to bring about a breach of security regulations than to create the feeling that documents are classified haphazardly at the whim of the military."

Over-classification does just that.

Being the new security classification as Restricted, Confidential and Unclassified, the Navy directive listed a variety of what it termed "security phases" to guide the industry in its handling of classified information.

Thus, the Confidential classification was broken up into five "phases."

Here are the new security phases of the Navy's public release grade, listed slightly for easy reading:

1. Security Phase 51: Substantial amount of information concerning projects and equipment in this early security phase may be disclosed after review, if it does not disclose existence of the project.
2. Security Phase 52: Since in Security Phase 51, except that work of the contractor concerning equipment and projects in this phase is classified Confidential.
3. Security Phase 53: In this phase, the need to control the content of projects is equivalent to larger scale. Security protection is continued by means of retaining significant information at the Confidential level.

The following list indicates the general scope and type of sensitive information:

- (1) Model designations or other brief identifying description of the equipment or project.
- (2) The classification may be identified as holding a higher contract. The total dollar value of the contract may be announced.
- (3) A very limited statement that discloses the general purpose of the equipment or project.

Security Phase 54, The external appearance of equipment and of both and other laboratory scraps of projects is included provided internal details of the equipment or fundamental principles involved are not further disclosed.

The following types of data may be disclosed without restriction by OPI Office of Public Information, Department of Defense:

- (1) External photographs of a general nature that do not reveal classified information or other classified data.
- (2) Secondary more liberal statement regarding the purpose of the equipment or project.
- (3) Public display of equipment in press-out, guarded area provided classification is not revealed during the display. Each such display, including subsequent sets of the same

Classification Chart of USAF Aircraft and Engines									
Basic Information	Category 1 Aircraft of new design (Phase of development) and production				Category 2 Modified version of existing aircraft (Phase of development) and production				
	1	2	3	4	1	2	3	4	
Model designation and nomenclature, and engine model and manufacturer	C	C	U	U	C	C	U	U	U
General operating data information	C	C	U	U	C	C	U	U	U
Physical characteristics including design weight	C	C	U	U	C	C	U	U	U
Performance in preliminary tests	C	C	U	U	C	C	U	U	U
Exact performance and characteristic data	C	C	C	C	C	C	C	C	C
External photographic, drawings, floor plans, design and model including launchers	C	C	U	U	C	C	U	U	U
Internal plans and drawings	C	C	U	U	C	C	U	U	U
Assembly details which are not used in final assembly	C	C	C	C	C	C	C	C	C
Control and guidance details	C	C	C	C	C	C	C	C	C
Launch details	C	C	C	C	C	C	C	C	C
Topological details	C	C	C	C	C	C	C	C	C
Wind-tunnel data	C	C	C	C	C	C	C	C	C
Date of Information	Category 1 Military aircraft engine of new design (Phase of development) and production				Category 2 Modified version of existing engine of military value (Phase of development) and production				
	1	2	3	4	1	2	3	4	
Model designation and manufacturer	C	C	U	U	C	C	U	U	U
Type of engine, dimensions and power in final form	C	C	C	U	C	C	C	U	U
Specific performance and characteristic data	C	C	C	C	C	C	C	C	C
Internal photos and drawings	C	C	C	C	C	C	C	C	C
External photos and drawings	C	C	C	C	C	C	C	C	C
Engineering design information	C	C	C	C	C	C	C	C	C
—B—General	C	C	C	C	C	C	C	C	C
—C—Confidential	C	C	C	C	C	C	C	C	C

*Excluded from Confidential only items approved by USAF. Confidential based upon recommendations submitted by the appropriate military air command.

equipment, engine specific authorizations from the Federal Aviation Authority.

(4) Limited statistical regarding performance. (No statistical data, only generally descriptive characteristics.)

c. **Security Phase C3.** Certain other information is classified on that, in addition to the foregoing, the following is eligible for release to the public after review and approval by GPH.

(1) Articles and information describing general features of equipment and aircraft.

(2) Such performance and technical data as may interest the public but cannot be controlled by its export to meet accurate performance data. For example, it would be permissible to state that an aircraft is "in the 600 mph class," when actually it may be capable of breaking 600 mph.

(3) Internal views that discuss no classified matter.

(4) Public display of equipment, if adequately guarded. Entrance to an exhibit and access to exhibit shall be prohibited if compromise of classified matter could result.

f. **Security Phase G5.** Equipment in this security phase is sufficiently classified to permit sale to domestic concerns of the United States on restricted equipment. These concerns, however, sufficient classified information concerning this equipment to enable export to enable to foreign concerns peripheral to the interest of national security.

Such data is an extension to exist, countries and specific may be furnished to purchasers and prospective buyers.

Classified information may not be released and shall be controlled prior to sale. Articles and information proposed for public release, which are not revealing that a permissible within the preceding security phases, are subject to the following review:

a. **Security Phase U.** When an equipment as project is listed in Phase U, it is considered classified, provided all classified concerns and equipment authorizations, if any, are first satisfied.

-WKC

CAB Proposes DC-3, L-18 Modifications

Civil Aeronautics Board has proposed modifications for Douglas DC-3 and Lockheed L-18 Lockheed that will be as serious as tailfin speed limits. The L-18 and L-19 to be converted. It does not adversely affect flight characteristics of the transport.

Other features of the new proposal include:

• **Excessive tailfin power to more than 1,570 hp per engine if compliance is shown with powerplant installation,**

flight characteristics and ground handling equipment.

• **New maximum certificated weight of from 25,700 to 26,000 lb for the DC-3 and 18,100 to 18,500 lb for the L-18 can be established if the airplane meets structural requirements.**

• **Maximum weight of more than 26,000 lb for the DC-3 and 19,500 lb for the L-18 may be established in accordance with the performance, structural, flight characteristics and ground handling requirements.**

An airplane flight manual would be provided for each DC-3 and L-18 that has new maximum certificated weight. Comments on the new regulations must be sent to CAB before Feb. 30 for consideration by the Board before the proposal is adopted.

Comet 2 Tests

• **Jet airliner begins final trials, sets speed mark.**

• **New transport relieves gloom caused by crashes.**

(McGraw-Hill World News)

London.—De Havilland Aircraft's first prototype Comet 2 is up to the last lap of flight tests, flying 3,000 an hour from base to Blackpool, Salford, at a speed of 461 mph for two hours.

The Series 2 jet transport—fitted with a new wing to improve lift (Aviation Week, Dec. 7, p. 13)—is undergoing tests in Cheshire, where ambient temperatures are approximately 100F during this time of year. The airliner soon will fly to Jan South Airport at Johannesburg to test performance off a 5,000-foot high field.

• **New Outlook.**—Promise of an operational Comet 2, with first models scheduled to enter British Overseas Airways Corp's South Atlantic service in August, at last may relieve the gloom caused last by the crash of a Comet 1 (Aviation Week Jan. 18, p. 17).

British's aviation industry also is cheered by the transport's record London-Blackpool flight, taking off at the Comet 2's maximum gross weight of 120,000 lb and carrying 10,300 lb payload and 6,900 gal of fuel—not far off the normal maximum requirements for a flight of this length.

• **Conflicting Reports.**—Meanwhile, in ports from ill as the BOAC Comet 1 crash Jan. 16, killing 35 persons, are growing more optimistic for its conduct.

Other than the fact that an explosion apparently occurred under the floor of

the fuselage, investigators are unable to trace any more light in the case of the crash. Salvage operations to recover the wreck from some 600 ft of water will take quite a while if they succeed at all.

At London Airport, BOAC's "no haste and ordered" technical examination of its continuing operational Comets has failed to produce any clues. • **Rumors Swirl.**—Question now is whether to remove services with the Comets. Minister of Transport Avon Lennon-Bowd obviously is responsible for this decision, despite the fact that BOAC, not the minister, grounded the aircraft originally.

• **Next London Report last week.** "The question of resuming the service will be faced up to long before the report of the investigating board(s) is received."

• **Flying Fleet.**—From the structure department at the Royal Aircraft Establishment at Farnborough, mean while, more evidence about Comet crash was made known. All the work says that is left of the BOAC Comet 2 crash over Colombia last May is being rebuilt by passing parts into a wooden framework.

Dr. P. B. Walker, head of the structure department, says his team has established the probable sequence of failure in the Colombia crash.

"We think that the starboard tail plane failed first," he says, "and then the port tailplane. That the starboard wing was used and then the other wing was used."

What caused this sequence of failure? Dr. Walker believes both fire and ice played a role in the crash.

No structural weaknesses have been found.

The broad conclusion:

• **Comet on ice** whether that would have broken up any aircraft, or—

• **Something happened** which led the aircraft to a very abnormal condition of flight.

• **Overconfidence.**—These tentative conclusions make interesting reading along with the report last issue of the official inquiry committee on the Colombia accident. That report carried an unflattering appendix, claiming "primary failure of an elevator gear as believed" forced the sequence of failures in the crash. (Aviation Week, Jan. 25, p. 17). Farnborough's findings tend to support this.

The Indian minister attributed the failure as the cause to overconfidence by the Comet pilot. He suggested in the Comet's booster control system be modified to give the pilot a positive feedback of loads exerted on surfaces.

Farnborough subsequently made the same conclusion, but Dr. Walker's reference to "very unusual conditions of flight" indicates the Indian analysis may have been correct.



HORTON PROTOTYPE looks at Santa Ana, Calif., after successful 28-min. flight

Horten Flies Wingless Aircraft

Santa Ana, Calif.—Designer William E. Horten has made the first successful test flight of his "wingless" Horten experimental aircraft at the Orange County Airport here.

The plane immediately produced by Horten Aircraft Co. is a 50-plane experimental model capable of carrying flight from Los Angeles to New York at 100 mph.

Horten and his associates spent more than a year modifying the design of the successful aircraft after it already crashed on its first test flight Nov. 13, 1957. The plane flew in a cleared field after staggering through the air for a mile in a stalled attitude.

• **Maximum Lift.**—The 57-year-old engineer designed his aircraft flight at the RW-18-16-52 project which he traces the theory of the theory of velocity pressure. He explains that an aircraft can lift off all or part of its own weight.

• **First Horten's test successful test flight lasted for 20 min.** After climbing to 2,000 ft, he put the strange craft through climbs, banks, turns and glides during which "he handled beautifully."

The test day—with a crowd of some 50 spectators looking on, including stockholders, associates and photo reporters—had more than two hours including sunset in time.

• **Discussed Tailfin.**—Civil Aeronautics Administration officials stated that Horten said the aircraft still developed broad-based delta fins, because a second spread tailfin would have caused loss over a nearly accidental area.

Despite this handicap, the Horten aircraft flies at an altitude of approximately 370 ft. After what appeared to be a somewhat shaky climb, Horten made several passes low over the field, soaring upward in a steep climb turn after turn. Stability seemed to be good at low speeds.

Horten says latest speed of the Horten experimental plane was 60 mph. The aircraft was carried aloft by two 450 hp Pratt & Whitney Wings, which replaced the 220 hp Jacobs engines and during the attempted first flight.

Other changes state that flight include larger propellers, control surface modifications and elimination of tri-cyclic gear.

The pilot-designer estimates landing speed at 50 mph and emphasizes the safety feature of the aircraft's low landing and takeoff speeds. He declares that the aircraft's flying speed gives him to say he is indicating about 125 mph on his fly.

• **Low-Cost Transport.**—Horten states that the combination of extremely high lift with low wing loading provides safety inherent in a great day planes and eliminates the need for long, expensive runways for aircraft with heavy payloads. The design will provide the lowest cost per minute for an transportation yet possible, he says.

Horten commented somewhat modestly after his flight that "this proves the theory." But there is nothing modest about the press brochures that analyze the Horten "wings" as "the greatest unarmored engineering achievement of all ages" and "the

greatest advance in aviation since the advent of flying."

• **Ad Hominem.**—says the association, "has borrowed the maximum energy of air." The man who designed the airplane which offers "100% greater payload with 100% greater wing" believes that man came with Leonardo da Vinci and the Wright brothers, it asserted.

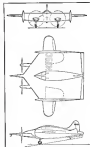
• **Experimental Model.**—Horten says the RW-18-16-52 is an experimental model to test his new theory and has little relationship in appearance to planned production models. Velocity is very poor, he admits, but this will be corrected in production models by increasing the wing area.

Designation of the aircraft as "wingless" appears to be a misnomer, because a great deal of wing area is in evidence. This is supplemented by two swiveling wings that extend beyond the main wing frame, which Horten says aid in velocity increases.

The retractable wings are turned "lateral control flaps" and the ones are mounted the aircraft at the conventional three-control system. Extended in flight, they may be retracted on the ground to save storage space.

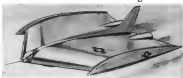
The aircraft is constructed of a composite fabric shell framework covered with fabric. It is 25 ft wide from end to end and extension of the so-called control flaps extends the width to 44 ft. It is 58 ft long. Wing loading is given as 8.5-9.7, power loading as 7.5-8.98 and aspect ratio as 1 to 0.08.

Elimination Standard two-position propellers are mounted on 14-ft shafts that extend forward on either side of the



CONFIGURATION of prototype Horten

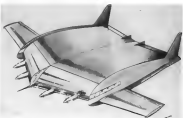
Horton Has These on the Drawing Board...



INTERCEPTOR BOMBER, powered by two turbojets, is designed for 15,000-mph range. Two versions of the type are contemplated, one with 40-l. jets, one of 60-l. jets.



"JUMBO" TRANSPORT, seen by illustration is capable of lifting 4,000 troops more than 25,000 mi. at speeds in excess of 400 mph. Engines would burn out 35,000 hp. each.



PASSENGER TRANSPORT is used to take 500 passengers safely while leaving stability through turbulent seas above powerplants. Its planned interior width is 13 ft.

space case. The proposed executive model may have partial propulsion.

Single rubber is the center of the fuselage is conventional, but vertical control is provided by a split elevator mounted below and to the rear of the tail and extending from outer to outer. The executive model calls for rubber mounted on the trailing edge of the outer.

Retractable landing gear and the "lateral control flaps" are electrically operated.

• **Adaptable to Turbine**—The design is adaptable to incorporating turbojet or turbojet power, according to Horton, and the present experimental model is only the beginning of a new area based on the scaling of various theory.

Design proposals call for:

• **Jet-propelled intercepter-bomber** that could circle the globe and be "probably the most deadly flying machine of any age."

• **A 500-passenger super-transport** in which passengers will be seated side by side, all with a full front view.

• **Jet-propelled military transport** capable of flying 4,000 troops anywhere in the world.

"Another feature of this plane," says the brochure of the Jumbo, "is the loading and unloading of troops with out ever leaving the plane."

"In range of over 25,000 mi. makes it possible to transport complete armies to foreign fields, land the troops and transport which, without leaving the plane, hover around for as long as 4 hr., return to the landing area, pick up the troops and return to its base."

"It can transport loads by air the formerly required ships. Trucks, tanks and vehicles drive in as cargo door swings."

This series of airplanes would depend upon new Horton-designed turbo engines of 25,000 hp., according to the brochure, and for protection, it could carry its own fighter escort planes right inside.

—WJC

Fire-Bazed Meletron Restarts Production

Los Angeles—Meletron Corp., victim of a \$600,000 fire loss five years ago, reports production again under way.

Machine shop and fabrication operations have been set up in adjacent, newly leased quarters.

"We can restart production in extremely limited and we are not yet ready to start full assembly production, we have made a successful start toward full production operations," says president George A. Starbird.

Meletron Corp. is a principal supplier of precision gunnery-actuated machines for the aircraft industry.



What it takes... TO BUILD THIS TEAM

Today's most powerful deterrent against aggression are the wisdom and officers of the Strategic Air Command and their global B-36's. No combination of men and machines—by their mere existence—has ever been such a force for peace!

To build this team, Convair and the United States

Air Force developed production and training techniques unequaled in the history of aviation. From the beginning both the B-36 and its crews had "growth potential" designed into them. And instead of obsolescence, the stormy age made this team even more formidable in national defense.

It is this Air Force and Convair's joint effort which shows the maximum degree of performance—the 9th degree of air power.

Engineering in the 9th power

Los Angeles • Pomona • Colorado
Fort Worth • Denver • St. Louis

CONVAIR

EXTRA!



Mock-Up of Pin

TOOLING FACILITY for fibreglass parts . . . an OMOHUNDRO exclusive SHORTENS DELIVERY • SIMPLIFIES PROBLEMS OF QUALITY CONTROL

ANOTHER service, exclusively offered by Omohundro to users of fibreglass laminates, is a tooling facility within Omohundro's own organization.

Tooling know-how within the organization shortens delivery time and simplifies problems of quality control.

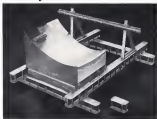
We can tool to any source of customer information—

ENGINEERING DRAWING
LOST DATA
MOCK-UP
SAMPLE PART

quickly and with better control.

FOR SPEED-EFFICIENCY-ECONOMY

Find out about the tremendous advantages of dealing with a reinforced plastics supplier with his own tooling facility! Contact—Paul Omohundro Company, Box 606, Paramount, Calif., TDerey 7-6917.



BASE FRAME. Strength and variable model construction for fibreglass parts, doors and other low-pile materials



PARTIAL RIG. A simple tooling unit for example, fuselage, entrance, inside body, and other aerodynamically shaped. The 6-point suspension of such structure gives durable, permanent master reference tools at low cost



OMO HUNDRO

Southern Representative: C. P. Waggoner Co.,

Box 1197, Grand Prairie, Texas



DISTINCTIVE COLORING of new Cessna 310 becomes clear at down-up in flight view.



SHORT-SPAN WINGS and shifter engine nacelles are highlighted in plan view at up

Cessna 310 Price Tag: \$49,995

New twin-engine business plane carries entire fuel supply in tip-tanks at maximum distance from cabin.

Cessna Aircraft Co., Wichita, Kan., has opened its local sales campaign to the company's new twin-engine 310 business plane with a dealer showing of the five-place and first anniversary of its price-\$49,995 runway flyer (Aircraft World Jan. 11, p. 13). Dealers are now taking orders with deposits. Some 300 members of the Cessna international sales organization attended the showing.

3200 Mph. Top-flight official specifications for this new 310 give it a top speed of 320 mph at sea level. Maximum gross weight is 4,600 lb., of which 1,710 lb. is useful load—including the persons, fuel and oil and less 355 lb. of baggage and optional equipment. Empty weight of the aircraft is 2,850 lb.

The 310 spans 31 ft., is 27 ft. long and 10 ft. 6 in. high. Powerplants are Continental 440 H engines, each developing 240 hp at 2,600 rpm using 91 octane fuel. They are similar to the engine used in the Cessna 180, with dual carburetors, higher compression, new-type head with electrical valves and high lift cam.

Propellers are all metal, self-feather-

ing with spruce as standard engine gear.

Competition.—The Cessna 310 is the latest of new light twin-engine business planes to be put on the market since the end of World War II and falls between the Beech Twin-Bonanza and Piper Apache in price.

The basic Twin-Bonanza sells for \$69,950 and the new Piper Twin 310 at \$52,780 to \$53,075, depending on equipment. The new Aero-Cessna standard base, of which more than 150 have been sold, starts at approximately \$66,000.

A useful number of the new 310s is expected to leave the production line at Wichita this year, with sales scheduled to be well underway next year.

Tip-tank. Feature—The new Cessna carries its entire fuel supply in stream-lined fuel-tipped 30-gal tanks at the wingtips.

The tanks are fitted with bladder-type fuel cells. This type of tank allows fuel to be at the maximum distance from the cabin, an important safety feature in case of crash landing. In addition, they allow the main landing gear to be fully retractable into the wings, lower-

ing speed slightly, and also provide an airfoil effect that allows the same lift coefficient with a shorter wingspan that a larger wing would give without tip tanks.

Retracting the wheels into the wings makes possible the use of shallow air-gate runways. On the 310 there is a maximum depth of only 25 in. Frontal drag is reduced by directing the nacelles to be parallel to the wing's dihedral.

A cross-hatched system is employed so that the pilot can see the tanks on opposite wings to supply either engine. There is no auxiliary electrical head pump.

Other Features.—Front seats of the five-place cabin have an aisle between them so that the pilot can return to his place without difficulty about seating passengers. A large door extends from the front door post to a point midway between one and front seats so that entrance and exit are possible without disturbing front seats.

Landing gear extension is electrically actuated so that the pilot, in event of electrical failure, can disengage the system and manually lower the gear. It is also electrically actuated in case of failure, the gear will lower by gravity with extra heavy springs locking the struts. Nose wheel is steerable to 15 deg in either direction by using the rudder pedals. Beyond that the wheel will center through up to 55 deg on each side of center.

Large split flaps, operated by an electric motor, can be lowered 45 deg.

Performance Details.—The company gives the following figures for Model 310 performance, noting that 60% power setting at 18,000 ft. is obtained in using 104 in. and 2,500 rpm, and 90% power is possible at 18,000 ft. by using 134 in. and 2,800 rpm. Cruise speed: 30% power at 8,000 ft. is 235 mph, 60% power at 10,000 ft. is 280 mph and 90% power at 20,000 ft. is 317 mph. Range at 60% power at 18,000 ft. is 875 mi. and at 90% power 10,000 ft. is 1,200 mi.

Rate of climb using both engines at sea level at 4,600 lb. is 1,700 ft./min. at 4,500 lb. it is 1,350 ft./min. at 4,000 lb. it is 2,000 ft./min.

Two engine service cranks at 4,600 lb. is 28,000 ft., at 4,300 lb. 27,000 ft. and at 4,000 lb. 24,800 ft. Single engine service cranks at 4,600 lb. is 7,500 ft., at 4,300 lb. 5,100 ft. and at 4,000 lb. gross weight, 11,000 ft.

Some 25 units make up the 310's standard equipment listing, including a 12,000 hrs. Servo-Warner heater with blower, dual standard piston gear, dual electric instruments, dual fuel and oil level indicators (Aerobac-driven), electric low oil temperature gauge, dual head temperature gauges, cabin heater, and a 250-watt Cessna lighting light among others.

is this your
timing
problem?



Sorry . . .
A. W. HAYDON CO.
can't help you -

Duly instructed, precision and
precision can improve your scores!

But
... if your problem
is **PRECISION TIMING**

you may save time, trouble and
money by investigating what our
timing engineers have done for
others. Our A.C. and D.C. electronic
units may already include the solution
of your most complex problem.
Why not find out?

send for latest
catalog manual.



**A. W. HAYDON
COMPANY**
332 NORTH 5TH STREET
MINNEAPOLIS, MINN. 55412

Design and Production of Electronic Timing Systems

India Gives Notice On U.S. Air Pact

(McGraw-Hill World News)

New Delhi-India has given formal notice to the United States that the Indo-U.S. air agreement will be terminated in 12 months, a decision described by observers here as an effort to obtain a greater share of traffic for its national civil airlines.

An official statement backs up this charge, stating the government wants to negotiate a new pact that would replace Pan American World Airways and TWA World Airlines flights "in order to conform with economic regulations and development" of government-owned Indian airlines.

► **Adequacy to Demand**-India strongly objects to a provision in the current agreement, signed Nov. 14, 1946, that sets PAA and TWA capacity at "adequacy to demand."

But U.S. officials say the two U.S. carriers are not taking over from India's international traffic volume and date. New Delhi complains that Pan American and TWA operations in India are violating the principle of the Fifth Freedom.

► **Dutch Protest**-Belgium to end the U.S. agreement follows a protest by The Netherlands that the U.S. just ended PAA and TWA over KLM Royal Dutch Airlines.

Under agreements with Holland and Britain, India has the sole right of flying between KLM and British Overseas Airways Corp. flights in that country.



Putnam Flies His Own

Carlton Putnam, Delta-CSS Air Lines board chairman, is soon with new Aero Commander twin-engine business plane he plans to use in keeping contact with the airline's flying schedule. Putnam holds both commercial and multi-engine pilot ratings and expects to log more than 400 hrs. this year.

Now open at Lockheed in California...

131 new career positions for engineers

Lockheed's expanding program of diversified development is resulting in more and better careers for engineers.

Projects in development include:

- 1. new missile division**-Lockheed has established a new division to deal exclusively in design, development and production of missile systems and their electronic systems.
- 2. nuclear energy**-Lockheed has expanded a contract to study nuclear energy applications to aircraft.
- 3. advanced fighter**-Lockheed has received a development contract for the highly advanced XF-104 day superiority fighter.
- 4. continuing development of production aircraft**-Development work on production aircraft is continuous at Lockheed. New orders for the Super Constellation have increased Lockheed's backlog for maintenance. Lockheed now has 18 airlines throughout the world as Super Constellation customers.
- 5. jet transport**-Lockheed is continuing design work on jet transports. Other diversified development projects are in progress.

As Engineers in the Armed Services you are invited to prepare for the day when you receive your civilian career by contacting Lockheed now.

Positions now open include:

- aeronautics engineers
- aerodynamics "A" and "B"
- engineers for aerodynamics wind
- thermodynamics engineers
- thermodynamics "B" and "C"
- engineers for thermodynamics wind
- design engineers "A"
- flight test engineers
- flight test and instrumentation
- service manuals engineers
- structures engineers
- design specialists
- with radio and communications order work
- to design flight control and guidance systems
- for guided missiles
- research engineers
- with experience in vibration tests and measurement
- techniques for structural vibration diagnosis
- research specialists
- with extensive experience in microwave analysis
- and development

Get more career ideas now

Lockheed invites a qualified engineer to apply for these positions. Descriptions are in your consideration.

Mr. E.W. DeLozier,
Engineering Personnel, Dept. AP-2
Lockheed Aircraft Corporation
Burbank, California

Or Mr. J. P. Phillips, send me an application form and literature
to receive teaching life and work at Lockheed in California

My name

My present engineering

My present address

My city and state

Lockheed

AIRCRAFT DIV., BURLING, CALIF.

87 Westinghouse products bring tomorrow's aircraft

One step closer

In Vinci's concept never envisioned the supersonic age . . . or the complexity of modern aircraft. But in this "Span of Flight", aviation designers have telescoped centuries of normal evolution into fifty short years of accelerated progress. 87 Westinghouse products have helped make this possible. Yes, it's true, between Magnums . . . turbojets . . . fire control radar . . . electrical systems . . . aircraft motors and Nicams* there are 87 different Westinghouse products helping the aviation industry bring tomorrow's aircraft—One Step Closer.

This scope of Westinghouse aviation is important to you. Not only the particular advancements highlighted in this "One Step Closer" series, but any one of the 87 products can become a solution to your subsequent or component parts problems. Drawing from the engineering and productive skills of twenty-three divisions, they are part of a continuing research and development program dedicated to improving the capability and potential of tomorrow's combat and commercial aircraft.

SEND FOR "SPAN OF FLIGHT"

This special photographic document was prepared to emphasize the Westinghouse ability and interest in helping you achieve the goal of tomorrow's aircraft. It encompasses the "Span of Flight" from Leonardo da Vinci's 14th century "flying machine with a man" to a current NACA concept of tomorrow's aircraft. It is yours — a beautiful paper, without copy and suitable for framing — for asking us just how many Westinghouse aviation products are known to you. Check them in the coupon below . . . your "Span of Flight" will soon be on its way. (100)

YOU CAN BE SURE...IF IT'S
Westinghouse



WESTINGHOUSE ELECTRIC CORPORATION
3 Bellway Circle, P. O. Box 818
Pittsburgh 30, Pa.

Know Westinghouse makes these products:

- | | |
|---|---|
| <input type="checkbox"/> Turbojet engines | <input type="checkbox"/> Gyro motors and |
| <input type="checkbox"/> Jet-propelled radio and | <input type="checkbox"/> Step-by-step control panels |
| <input type="checkbox"/> Fire control systems | <input type="checkbox"/> Generating equipment, |
| <input type="checkbox"/> Communications equipment, | <input type="checkbox"/> diesel turbines, condenser |
| <input type="checkbox"/> air drives and systems | <input type="checkbox"/> Aircraft turbine engines and turbo |
| <input type="checkbox"/> Aircraft skin and systems | <input type="checkbox"/> Steam-turbine units and the pumps |
| <input type="checkbox"/> A-1 and A-2 | <input type="checkbox"/> Wheel tread drives and wheels |
| <input type="checkbox"/> All types helicopters, | <input type="checkbox"/> Aircraft lighting and wind |
| <input type="checkbox"/> includes many and variants | <input type="checkbox"/> air-cooled equipment |

Please send me "Span of Flight" without copy and suitable for framing.

Name Title

Company

Address

City & State

DESIGNED BY LEONARDO DA VINCI, "FLYING MACHINE WITH A MAN" COURTESY BRITISH AIRCRAFT DEVELOPMENT BOARD AND PRESENTED BY NACA, NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, WASHINGTON, D.C.



VOUGHT REGULUS surface-to-surface Navy missile is launched vertically by Rite. Note outward air-breath jet. It is not apparent in photo (below) of Flight Test Vehicle X.

Navy Tests Vought Regulus Missile



FLIGHT view of Regulus X88834.4 details: wing leading gear with dual nosewheel.



TOUCHDOWN is made under eye of pilot in Navy Lockheed T-28 (F-80), right.



BRACING CHUTE OPEN to slow landing run, slotted Regulus runs end of a test.

Mexico May Shelve Airline Ticket Tax

(McGraw-Hill World News)

Mexico City—A new transportation law passed here this month, ending the imposition of an 8% tax on all tickets purchased in Mexico for international airline flights, but exempting Mexican companies, probably will not be applied, estimated sources here say.

U. S., Canada and The Netherlands have filed formal protests against the discriminatory tax. The tax was scheduled to take effect Jan. 22.

However, it was learned that although high Mexican government officials were against to favor of the new law's provision and planned to shelve it.

The tax would penalize travel on such U. S. carriers as American Airlines and Pan American World Airways, while granting an advantage to Compañía Mexicana de Aviación, which flies to Los Angeles, Houston and U. S. border points, and to Aerovías Chivas, which has a route between here and Mexico.

Later company has felt the most strong competition from new aircraft service established by Aerovías and P.A.A.

U. S. has no air agreement with Mexico, thus making it difficult to protect such unilateral treatment. Cuba, however, is reported planning to retaliate against Mexico if the air transport tax is imposed.

Board Lowers Mail Rates of Four Airlines

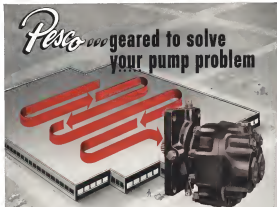
Civil Aeronautics Board, bowing to Post Office Department pressure, late promptly has lowered mail rates of Boeing, Capital, Delta-CGS and Western Air Lines.

The board also has finished present reduction of National and Northwest Coast Airlines' mail rates from 55 cents to 45 cents a ton-mile. This is the same maximum regular annual rate that American, Eastern, Texas World and United Air Lines have received since 1950.

The new rate schedule for the four smaller airlines now becomes 45 cents on routes where they compete with the other 45-cent carriers and 55 cents on noncompetitive routes, such as before.

When the Post Office recently announced it would stop mail via the scheduled airline with the lowest rate effective Jan. 1, 1974, CAB proposed lowering 50% of beginning rates on competitive routes but increasing them on other routes to offset the cut.

Post Office Department objected, so the Board has ruled the noncompetitive rates on below 55 cents pending investigation.



Take advantage of the outstanding and complete Pesco facilities for engineering, testing, and volume production of a pump to fit your specific installation.

PESCO ENGINEERING, with 20 years of experience and "know-how" in pump design and application will provide you with the one best component for your requirements.

PESCO RESEARCH AND DEVELOPMENT TESTING will assure your component of "performance-proven" efficiency and long operating life.

PESCO PRODUCTION builds in each unit uniform high precision and quality, ensuring maximum performance and dependability.

If you need pumps, motors, or accessory units for fuel, hydraulic, or air applications, contact Pesco. All the advantages of Pesco experience, engineering, and production are at your service. Simply call or write the Home Office, Bedford, Ohio.



Pesco Model PEP-100 Engine-driven Hydraulic Pump with 2 1/2" outlets and 4" displacement, 8 gpm @ 1500 gpm and 1800 gpm. Weight 3.65 lbs.

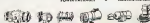
YOU CAN RELY ON PESCO *Promote* *Produce* PUMPS FOR THESE ADVANTAGES

DEPENDABLE PERFORMANCE
LESS INSTALLATION SPACE REQUIRED

LOWEST LIFETIME COST

Call or write the Home Office, Bedford, Ohio for full information on these outstanding Pesco products.

HYDRAULIC PUMPS • **AIR PUMPS**
FUEL PUMPS • **HYDRAULIC MOTORS**
POWER PACKAGES • **ELECTRIC MOTORS**



BORG-WARNER CORPORATION
24740 NORTH MILLS ROAD • DESPOTO, OHIO

Each of the Acroter rocket is 120 ft and approximately 6 in. ft. of space is available for instrumentation in the laminarily sealed nose compartment. Welded construction is used throughout. The main body is an integrally welded stainless steel tank assembly. The porous tank, which contains helium for expansion of the liquid propellants, is located at the forward end of the rocket. This helium pressure applied to the propellant tanks causes the propellants to flow into the throat chamber for combustion.

Ribbed and welded constructions also are used for the nose skin. It then is spun to an agreed shape to house the payload.

Against General reports that a cylindrical crimper is often used for rolled payload volume. This is a rolled sheet which is welded to attachment container.

Description of a new kind of machine
needed in a West Coast movement

The inventor explained that the backpack will collect as many as

The device is turned off center and at right angle off center is at full efficiency to the unbalanced.

"It is started by slowly pulling a lever. The power machinery will not only drive the plane, but will balance and govern it so the plane will glide safely to a landing without human direction."

To the first requester who sends in a sketch or model of the machine developed solely from the description TARD will send a genuine, headfirst Mochus short, unobtainable in any store.

The only ice-covered socket test pit in existence is located—where else?—on the campus of Princeton University.

Add to your list of IAN standards these five extremely useful sentences, which—according to the *de Havilland* (of England) Gazette—were “designed in the light of many years’ experience by a team of aircraft fitters, who for obvious reasons prefer to remain anonymous.”



- **Deadly Night Shift Belt:** Very useful when holes are slightly out of line. Available in various engagement arms up to 1 inch.
- **Latched Nuts:** These nuts are available topped at various angles. The nut is held while the bolt (and the inspector's) head is turned.
- **Universal Handle Bolt:** For use where holes have inadvertently been drilled rather close to the head of angles or brackets.
- **Hexagons and Square-Rs:** Two rivets whose mechanism is easily apparent.—DAA

Douglas's C-47D transport was loaded up with soldiers in the weeks for previous years of war.

LOCKHEED'S 600 MPH Starfire hits the runway at a high speed—and hard! A new deceleration parachute lets it land on half the distance. And Timken® bearings on the wheels easily take the shock loads of the landing impact.

To take the heavy shock, these Timken bearings are case-hardened to leave a tough shock-resistant core under a hard, wear-resistant surface. And line contact between rollers and races gives extra load-

carrying capacity — maximum capacity per pound of weight. Their tapered construction lets them carry both radial loads and the thrust loads of cross-wind landings. They normally cushion the wheels.

Tinkles bearings have extremely low starting friction that lets the wheels accelerate rapidly when they hit the runway. Tire wear is held down. The true rolling motion and incredibly smooth surface finish of

Timken bearings practically eliminate friction.

Be sure to specify Timken bearings for landing gear and other airplane applications. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "Timkenco".



WE MAKE OUR OWN STEAK

The Timber Roller Bearing Company is the nation's largest leader in 1. advanced design, 2. efficient manufacturing, 3. rapid order cycle and 4. superior customer service.

TIMKEN
TAPERED ROLLER BEARINGS



NOT TECH A BIRD  NOT TECH A BULL  THE TOWN'S TAPACUL AGUA  ALARMS THREE BATHS  AND THREE  GOING TO ANY CONSTRUCTION 



Gladden
power brake valves



Sale and dependable work
in the broiling system
of modern fighters,
bombers and
transport aircraft



volume
producers of
aircraft
equipment

Gladden

For additional information, write Dept. 104

Gladden Products Corp., 635 W. Colorado Blvd., Glendale 4, Calif.

cannot hope to progress very far up the professional ladder. Then, in my experience, men start to make for a happy as well as a satisfied employee."

See enough interest.—His executive feels that industry should maintain a closer liaison with colleges, more faculty and administration with curricula. He says it up. "We're all very much interested in the schools every spring, a few months before a new batch of graduates is turned out and made available to industry, but we ought to be interested for 12 months every year."

His view for a closer relation approach to industry's needs is echoed in a conclusion of the report, which adds that industry leaders could and should participate actively in college programs by presenting and, if need be, teaching short courses designed to give the engineering student a closer picture of the profession which he plans to make his life's work.

Recruiting, Holding.—What are some of the recruiting techniques used to attract young engineers? The report dissects these procedures, points out where are effective and why.

"What inducements or techniques has your company found most effective in recruiting new engineering employees?"

Stripped of embellishment, the answer of a large number of executives boiled down to one word: "Money."

Yet, most of the engineers don't go along with the viewpoint—only 12.5 percent "financial rewards for these times of engineering is a profession."

Nevertheless, the report explains that money is often a necessary condition for an employer to make the conclusion that the engineer's rate of pay is within one of the most important factors in keeping him satisfied, if not the most important, after he gets over his apprenticeship and the stimulus of entering a new profession.

A majority of the executive report that offers of more money by competing firms constituted the largest single factor in three engineering segments. The report points out, however, that that is apparently not only of the engineer who has been in the profession long enough to have acquired a wife and family. Younger engineers (those in training) who responded were satisfied generally with salaries and other job factors. From this situation it is deduced in the report that money is not quite so important a factor as once it was in the case of the younger and more aggressive engineers before.

Old-line firms generally rely on standard recruiting practices—new paper and word of mouth advertising, sales engineer interviews and referrals by their own company. Some don't do any recruiting.

Training and other studies are among

inducements offered as substitutes for direct recruiting.

Letdown.—But thing the report on phrases—don't recall the job. Then, 20% of the engineers answered "No" to the query. "Was your first job one of the jobs as it was described to you at the time you accepted employment?" And nearly all of those who answered negatively are unhappy in their jobs, more so based after months of routine work, feeling that the company is not making use of their talents which were desired only a few months before.

About 20% of the engineers feel that their professional status is not recognized, 15% do not feel that their training and abilities are being used effectively.

Careers.—Congressmen find that one of the most successful techniques is to recruit job students during their senior year, give them temporary employment during the summer before they reach their senior year. This gives the student an idea of what will be expected of him, give the company the chance to weigh his capabilities.

Other recruiting techniques found effective by companies participating in the survey include a wide variety of test assignments for engineering trainees, work with products of a highly engineered nature, purchase of prototype, profit-sharing plans, payment of travel and moving expenses for new employees, extensive recreation facilities, use of employee-leaders as recruiters in college, and advertising in technical magazines.

Attitudes.—While the engineer enters the profession that because of attitudes (71.5%), usually because of professional status or work (55.6%), and partly because of financial reward (11.3%), according to the report, after he has been in industry for a time his attitudes change.

"Are you satisfied with your present job?" That question brought negative answers with respect to five different factors—status (45%), prospects (44%), working conditions (17%), nature of work (16%), and location of work (11%).

Many of the executives feel that the engineer's preoccupation with money is a manifestation of a "something for nothing" attitude. The representative of engineering personnel for a large venture aircraft manufacturing concern puts it this way: "Young engineers must be made to realize that their engineering understanding must be converted to productive output. Too many of them feel that they are undervalued a bigger job, but overlook the fact that their output on their present job is far from satisfactory."

More than half of the engineers do not know whether they are employed are satisfied with their work. There is also



Americas' northern defender

CF100 FLIES 2100 MILES NON-STOP AT 550 M.P.H.

North of the American border, R.C.A.F. squadrons equipped with the jet powered AVRO Canada CF100 roam the perimeter of the Arctic in flights that exceed the range of any other interceptor in the world.

The CF100, Mark 4, packs more firepower than that carried by any fighter interceptor now in service. With its radar tracking and fire control system, it can seek and shoot down "bombers" in any weather, day or night, and fly supersonic during attacks. It can "scramble" as quickly from advanced emergency bases at 60° below zero as it can in desert heat.

The CF100 with its two GRENDA jets, designed and built by AVRO Canada, is the delight of the men who fly them. While present production of this potent defender is for the R.C.A.F., guarding the North, this versatile aircraft is capable of the variety of tactical assignments:

1. GROUND ATTACK
2. GROUND SUPPORT FOR TROOPS
3. PHOTO RECONNAISSANCE
4. NIGHT INTERCEPTOR
5. LIGHT BOMBING/MISSILE LAUNCHING

VANCOUVER TO NORTH BAY

2100 MILES NON-STOP AT 550 M.P.H.

3 HOURS 50 MINUTES R.C.A.F. CF100 MARK 3

P/O W. J. Roberts, Pilot

P/O G. L. Turner, Navigator



Copter Engine Test Rig

An engine for Wright Cyclone K1240 as used with Kaiser-Frazer Corp.'s Kaiser 740c Division, Detroit, is brought through 144-lb. pressure test cell by Worthinghouse Testhouse Inc. One duct across engine in normal horizontal position, the other ducts

are in helicopter position, tested in a closed position (shown). Exhaust duct can be moved into position and clamped to an inlet opening in ceiling. Due to 92% air efficiency, Worthinghouse claims, saving of 50 hp. on low duct areas was possible.



A.V. ROE CANADA LIMITED

HALTON, ONTARIO



MEMBER OF THE HAWKER SIDDELEY GROUP

a feeling among the engineers that their professional abilities are not being utilized fully.

The report states that further work on improvement of communication between management and engineers stems indicated, and that possibilities of a motivating system should be explored. 75% of the engineers say they would like to have their work evaluated by a motivating system.

► **Professional Distinction**—Of the executives interviewed, 42% feel that the young engineers' attitudes are unjustified. Yet, a majority of the companies participating in the survey admit that little or no distinction is made between engineers and nonprofessional employees in the way personnel policies are concerned. The 40% who say they observe the distinction, for the most part do so only to the extent that they pay their engineers' salaries on a monthly basis and do not require them to punch time clocks.

Despite this, it is evident that some *intangible* distinction generally is observed, the report says, for only 29%

of the engineers queried say they do not feel their companies recognize their professional status.

The report states that membership in professional societies, and participation in technical, cultural and civic activities should be encouraged actively, both for the professional growth and social consciousness of the engineer. Public relations benefits also will accrue to the company from activities of this nature.

► **Inducement Factors**—Benefits and salaries closely linked with the engineer's security are most effective in holding him, the survey shows. How important security is, is indicated by the fact that of the more than 1,400 respondents in the questionnaire, 42% say they would not accept a higher-paying job, with more responsibility, if they were not assured of the same security of employment as existed in their current jobs.

Benefits such as the usual group-term life insurance, low-cost insurance, pension plans and retirement facilities won't draw new employees, but the company

does not offer them in at a sizeable disadvantage both from the standpoint of receiving and keeping company money, the report shows.

Benefits, in the main, are offered to all employees, professional and non-professional alike, as are many of the incentives, the report points out, but less the incentive category comes up special inducements which may be offered engineers and other professionals.

► **Typical Services**—North American Airlines, Inc.'s program is cited as typical of those offered by the larger industrial plants. Late nearly all own planes today, NAA offers a group health insurance plan, but in this it has mixed a blood bank. It also runs a \$100,000 a year recreation program, paid for by company funds and half from vending machine profits. Activities include base ball, basketball, football, soccer, boxing, swimming, tennis, bowling and other sports.

Stokes at NAA affords the opportunity to buy quality tools at greatly reduced prices. Other fringe benefits are the employee money.

A training program affords courses from the high school through the college level, with about 175,000 man-hours having benefited since the program was instituted in 1948. Stokes may also be pursued to outside educational institutions, with reimbursement of two thirds of the cost by the company if grades are passing. The suggestion box program is another strong incentive. Many of these incentives are offered by many organizations in the aviation field.

Indicating how far some companies go in offering services to the employees, the report mentions E. I. du Pont de Nemours & Co., Wilmington, Del. Du Pont's time purchase service is a vital cog in the company's production machinery. The corporation has learned that industrial productivity, instituted there on an experimental basis in 1944, pays worthwhile dividends in increased production and a constantly improving safety record.

It would appear, the report concludes, that there is still plenty of work to be done with profit in the field of incentives.

► **Opinions on Unions**—"Do you believe engineers' interests are strengthened consciously or otherwise by membership in a collective bargaining organization?"

Answers showed that 66% don't think so, while 34% answered "yes." In the group of 34% were approximately the same proportion of industrial and manufacturing engineers. In the report too, adding "It is evident, therefore, that the leading national labor organizations of so high a percentage of men who are profes-

every
salesman
an
engineer



BOSTON 291 South St. 2-2221
BOSTON 127 Park Square Bldg. Newton 2-2817
BIRMINGHAM 8 N. P. B. Bldg. 104 2-2141
NEW YORK 275 Broadway Grant 5-0300
PHILADELPHIA 835 East Lancaster St. Berks 4-0338
ST. LOUIS 1122 General Bldg. Slough 2-4320
ST. LOUIS 2200 South St. 775-0100
DETROIT 1122 General Bldg. Slough 2-4320
CHICAGO 1122 General Bldg. Slough 2-4320
CLEVELAND 2714 W. 13th St. Western 4-5454
INDIANAPOLIS 100 W. 18th St. Central 4-0000
KANSAS CITY 1122 General Bldg. Slough 2-4320
LOS ANGELES 100 W. 18th St. Central 4-0000
MEMPHIS 100 W. 18th St. Central 4-0000
NEW ORLEANS 100 W. 18th St. Central 4-0000
PHILADELPHIA 835 East Lancaster St. Berks 4-0338
ST. LOUIS 1122 General Bldg. Slough 2-4320
ST. LOUIS 2200 South St. 775-0100
DETROIT 1122 General Bldg. Slough 2-4320



F-89 Timesavers

New also used at Northrup Aircraft, Inc., Hawthorne, Calif., to speed production of F-89 fighter aircraft. In fact, the use of F-89 timesavers (shown) has reduced need for large stock of documents, and improved planning and control of the entire production process. At left is stock of 120 F-89s and other documents manually required to support one side panel of F-89, next to it is smaller pile of equivalent photo checklists.



NOTHING ROLLS LIKE A BALL

NEW DEPARTURE
BALL BEARINGS

NEW DEPARTURE BALL BEARINGS are the most advanced in the world. They are made of the finest materials and are precision ground to exacting standards. They are available in a wide range of sizes and types to meet the needs of all industries.

Close at hand to find a **hazafi** Whenever a design calls for ball bearings, call in your New Departure sales engineer. You'll find that he's a specialist in solving anti-friction problems. You'll find, too, that he cooperates efficiently with your designers and engineers. He's backed by the industry's most complete research and manufacturing facilities. Whenever your ball bearing needs, be sure to talk them over with a New Departure sales engineer.

**AN Fittings
Special Fittings
Flexible Metal Hose
Assemblies
Silicone Rubber Hose
Assemblies**

We will be pleased to quote on all AN fittings and special aircraft components. Write or phone for further information.

**AIRCRAFT
COMPONENTS
DIVISION**

DUNBAR KAPPLE Inc.
406 N. River St., Batavia, Ill. Phone Batavia 5400

17 S. Union St.
Batavia, Ill. 60010

177 Oakley Street
Moline, Ill. 61201

451 Transportation Bldg.
Lombard, Ill. 60148

10 Main St., Room 100
Mendota, Ill. 61850

1000 E. Main St.
Mendota, Ill. 61850

2000 River Road
Batavia, Ill. 60010

1811 E. Superior Avenue
Chicago, Ill. 60641

217 N. 1st St., North
Chicago, Ill. 60641

217 E. Pacific Street
North Chicago, Ill. 60062

217 E. Pacific Street
North Chicago, Ill. 60062

ments both by training and education has little of its experience with their attitude toward their own jobs."

The fact that as high a proportion of engineers turned on machines, made "a slaming trend which, if it continues, could become a movement which eventually could reduce the profession of engineering to the level of a trade," the report observes. In a survey one dated almost eight years ago, only 53 engineers themselves as facing such a future.

Of the 54% who believe in either low bargaining agencies, low wages from the group which had been graduated within the last two or three years. Most of them fall within the 25-to-35 age group.

The report concludes that the possibility of widespread, vigorous union or governmental activity among engineers is at the moment a distant one, but there has been an "alarming increase in the number of engineers who have so far deserted accepted professional standards as to regularly compromise in a favorable light."

The report says: "This trend could easily snowball into an unpleasant reality, particularly in the event of a business recession, and it serves as a clear warning that the professional societies and industry must take immediate steps to forestall the all-too-easy desertion from professionalism to trade unions."

Commenting on the suggestion of a university president viewing the union situation, that industry increases the rates of pay for that "workably neglected" group, the engineers with three, five, ten or twenty years of service to "compensate with the beginning salaries," the report says that this is too



Wire Coiler

Wire coils, developed by Gossitt complex automatically coils already wiring wire at low speed through strapping machine, replacing previous manual operation. The device consists mainly of a carrier contains fully automatic on a bottom plate. Wire moving through machine forms device to rotate and coil wire. Now in use on 15 General mechanics, company says device saves \$3,190 annually.

FLAME-PROOF FABRIC CONNECTOR ELIMINATES

"fire zone" fatigue



ARCOSIL FIBERGLASS DUCTING OFFERS NEW DESIGN APPLICATIONS

New techniques developed by Arrowhead in fabricating complex ducts, sleeves and couplings from Arcosil flexible silicone rubber impregnated fiberglass have opened amazing new design possibilities. In addition to Arrowhead's ability to withstand heat, vibration and torque-moment-fatigue, the materials permit the parts to be formed to almost any conceivable shape and size to meet individual applications. A variety of standard constructions offers serviceability under extreme high and low temperatures real at various pressures.

Closely tolerance tooling and production costs are not a factor, as compared with metal, to effect sizeable savings in either experimental or production quantities. Up to 50% weight reduction is possible. Flexibility permits cranking without damage and simplifies installation.

Arrowhead specializes in solving difficult flex-connector problems in fuel, oil and air systems. Arrowhead field engineers will gladly provide further information and assistance.

WRITE FOR ENGINEERING BULLETIN
describing complete line of ducts, sleeves and couplings



ARROWHEAD RUBBER COMPANY

2240 CURRY STREET, LONG BEACH, CALIFORNIA

Products: Fiberglass of silicone rubber, Ducting of rubber-fiberglass ducting



...EVER DEPENDABLE

Bendix® Radio airborne units provide instant transmission and reception on 360 crystal controlled channels . . . Single frequency selector controls both transmitter and receiver . . . Ground station gives clear 2-way voice contact from ground-to-air or point-to-point service.

Here it is . . . all wrapped up in a single Bendix system . . . complete VHF airborne and ground station communications!

Airborne receiving and transmitting is controlled from a single frequency selector. (The Bendix MN-81 on the opposite page).

No more confusing channel letters. No more conversion charts. A flick of the finger and you select any of the 360 available frequencies. You don't have

to crank or fiddle to transmit or receive.

Bendix Ground Station

The ground station is the newest development in the complete Bendix line of VHF communication equipment. Here is local or remote control as you wish. Fifty watts output . . . 117 volts input power.

A Complete System

Whatever your requirements . . . now as always . . . whenever you need VHF communication you can always look to Bendix . . . The Name Millions Trust.



Bendix Radio

DIVISION OF BENDIS AVIATION CORPORATION • BALTIMORE 4, MD.

Export Sales:
Bendix International Corporation,
285 E. 42nd St., New York 17, N.Y., U.S.A.

West Coast Sales:
50550 Alameda Blvd.
North Hollywood, California

Southeast Sales:
2000 Tenth Field Drive,
Buckley, Illinois

Canadian Distributor: Aviation Electronics Ltd., 280 Lawrence Blvd., Montreal, Quebec

© 1965 BENDIS RADIO CORP.

VHF COMMUNICATIONS



**RA-18
RECEIVER**
Weighs only 18 pounds



**MN-81
CONTROL PANEL**
Instant, fingertip control.



**TA-18
TRANSMITTER**
Provides 25 watts r-f output



**VHF
GROUND STATION
TRANSMITTER AND RECEIVER**
Local or Remote Control

AVIATION WEEK

NEW AIRPOWER DOCTRINE Twenty-First Annual

THE NEW AIRPOWER DOCTRINE will guide the destiny of the Aviation Industry for the next three years. Basically the new doctrine recognizes that Airpower is the keystone of U. S. Defense Strategy in the Atomic Age and calls for a continued expansion and strengthening of our national Aviation Resources while gradually reducing the obsolescing

Coming March 15th

TODAY — Make your advertising reservations. Regular advertising rates apply. Order extra copies at \$1.00 each.

MILITARY AVIATION — The new job techniques and equipment will be the new National Airpower program. Complete specifications on all new Military Aircraft and Engines. New details on Aviation Air Power.

GENERAL AVIATION — General Aviation is the key to the new Airpower Doctrine of Military, Business and Government. The rapidly expanding field, Aviation Market now calls for a better Airpower Industry.

RESEARCH AND AVIATION INDUSTRY — Success of Aviation Industry depends on the Airpower with complete details and charts dealing with latest air conditions. Details of Airpower Industry and Aviation Industry. New Air Power Doctrine.

AVIATION FOR AIR POWER — Special Report on the latest developments in Military and Commercial Aviation. The Aviation Industry is moving to the forefront of Aviation Industry with a wealth of information covering the manufacturing and financing plans of the industry.

FOUNDED FLYING — The steadily increasing sales of Airpower for Industrial and Professional use is moving to the forefront of Aviation Industry. A wealth of information and charts dealing with the Aviation Industry will be in the Airpower Industry of this nation.

RESEARCH — The new Airpower Doctrine, depends on the success of Aviation Industry and Government. — Success of the new Airpower is the key to the success of the Aviation Industry. A wealth of information and charts dealing with the Aviation Industry will be in the Airpower Industry of this nation.

COMMERCIAL TRANSPORTATION — The latest and the Airpower Industry is moving to the forefront of Aviation Industry. A wealth of information and charts dealing with the Aviation Industry will be in the Airpower Industry of this nation.

—Keynote of AVIATION WEEK's "Inventory of Airpower"

traditional Armaments of surface forces both on land and sea. The new Airpower Doctrine of U. S. Defense recognizes that true Airpower is composed not only of Military Aviation but also of Civil Aviation elements such as the Airlines, Business Flying Fleets and the Manufacturing and Overhaul facilities of Private Industry. This new Airpower Doctrine was developed by the Defense Department late in 1953 and was approved recently by the National Security Council and President Eisenhower. It will be the blueprint for the development of Military and Civil Aviation during the next three years. The 21st Annual Inventory of Airpower issue of AVIATION WEEK will be keynoted by an analysis of the new Airpower Doctrine and its effects on all of the special phases of the Aircraft Industry by AVIATION WEEK's expert staff and documented by official fiscal figures and specification charts.

Inasmuch as the 21st Annual Inventory issue will be a record one in terms of industry usefulness, Military and Government reference, all companies Manufacturing for or serving the Aviation Industry are urged to be represented in this edition.

McGraw-Hill Publishing Co., Inc., 330 West 42nd St., N. Y. 36, N. Y.

Other Advertising Sales Offices:
Atlanta 2, Ga., 221 Atlantic-Bowling Alley
Boston 11, Mass., 220 Park Square East
Chicago 11, Ill., 200 N. Michigan Ave.
Cleveland 15, Ohio, 1515 Avenue King
Dallas 1, Tex., 1501 National Bank Bldg.
Detroit 26, Mich., 444 Fordway Bldg.
Houston 10, Texas, 1001 Texas Tower Bldg.
Los Angeles 17, Calif., 1111 Wilshire Blvd.
Philadelphia 12, Pa., 720 N. Oliver Bldg.
Pittsburgh 3, Pa., 1018 R. B. Brown Bldg.
San Francisco 4, Calif., 400 Post St.
St. Louis 4, Mo., 1000 Market Bldg.

Member ABC and AEP

AVIATION
WEEK
"The Key to the
Inventory of Airpower"
NEW
AIRPOWER
DOCTRINE

LOOK TO THE SKY FOR YOUR MARKET!



BUILT-IN TEST BOX permits complete check of Altec plug-in units in less than one hour. Test panel shows green light if unit is good, and light if it must be replaced.

(12 operations), the computer automatically gives the operator a check to be sure that it is operating satisfactorily. This is accomplished by introducing known inputs which should produce a specific answer. If the computer produces the right answer, the machine continues its assigned problem; if not, it stops and signals the operator.

By means of a special test panel, the operator or maintenance man can quickly determine which portion of the computer has failed by observing any error indicators. All computer circuits are constructed on plug-in cards; replaced, plug-in circuits, using ready-made and interchangeable construction techniques.

Exclusive of power supply, Janscomp-G occupies a space of approximately 22 x 24 x 28 in.

Total number of tubes, all subminiatures, is 360. Computers will operate from 100 or 60-cycle power.

Janscomp-D. The D model uses 36-digit machines instead of the 24-digit units in the G; has a larger magnetic storage capacity (64,384 bits vs. 57K bits), and can be used with an external magnetic tape for increased storage capabilities.

A larger number and variety of internal circuits give the D more flexibility; permit its use as a general-purpose digital computer. The D design occupies three cabinets, about the size of the G, and employs 1,560 vacuum tubes.

Jacobs says it has completed the "logical design" of the D, and tested all basic circuit groups of which are used in the D. Company adds that it is looking "openheartedly for the construction of a Janscomp-D machine."

Alwac

Altec Research, Inc., which markets the new low-cost general-purpose Alwac, is headed by Glen H. Hagen, former supervisor of the computer research group at Northrup Aircraft, which developed the Modula-44, an electronic digital differential analyzer. (Computer Research Corp., which also makes a small low-cost, general-purpose digital computer, Cade 101A, was the former partner in Northrup's computer group.) Hagen was also recently general manager of Boulder Aviation's computer division.

Alwac is a small-type, binary machine with an internally programmed magnetic drum memory capable of storing 2,048 words. Machine instructions can be entered from an electric typewriter which converts decimal numbers to binary code, perforated, or magnetic tape, automatic plug follows. Control output may be fed to a graph plotter or electric typewriter.

New Enlarged Memory-LRI has developed a new technique for constructing magnetic storage drums which enables it possible to fit large-diameter drums relatively inexpensively, increase storage capacity 380 times, company says. LRI says its 6-in. dia. drum can store nearly a million words.

Precision techniques have required precise control of air gap distance between drum and its rotary magnetized read-write heads. To maintain consistency, solid metal drums had to be machined to very close tolerances. Any drum warpage after machining caused trouble.

Flaming Head-LRI has applied the



High G-Rate Gyro

Minicor G-rate gyro, capable of measuring maximum turning rates of 3 to 400 deg./sec. and withstanding high G-forces, has been developed by Minicorporation's Aerospace Division and will be used in company's new autopilot. Designated the GG15A minigyro, device employs novel design techniques to increase size of gyro mechanism to permit smaller, but small, other advantages in achieving miniaturization. It can be provided with one or two potentiometer outputs, and noncontact switch if required for central gyro control output. MR says device meets MIL-E-5725, can be provided with our required damping ratio between 0.2 and 1.0.

Baronoff effect by designing its output error leads to that of a system of an 6.000 in. thick, as a result, its gyro is closely contained despite centrifugal forces in the device. Using the floating head technique, drums can be constructed out of steel shafts, be accurate thousands of in. per cent of error, yet cost less than 5% variation in signal level, company says.

Altec has built its test circuitry for simplified trouble-shooting, although LRI has sufficient confidence in the machine's inherent reliability to guarantee it for one year against failure resulting from normal usage. The signal purchase price includes scheduled maintenance service by LRI for a year, the company says.

New Devices to Aid Servo System Design

A variety of new devices which may aid servo system designers in getting smaller, more reliable or lighter-weight systems, has been announced recently. The devices are:

- **Bridge comparators.** Full-wave dual-bridge comparators, for use as a modulator, rectifier, or chopper, cover the frequency range of 0 to 5,000 cps, with conversion accuracy of 0.5%, but linearity of 1% of full scale, according to manufacturer. Device has no moving parts, comes in a hermetically sealed plug-in case, 1 in. dia x 3 in., weighs 3 1/2 oz. and is designed for operation between -55C and 57C. Microscopic input voltage is 60 v.; maximum reference voltage is 120 v.; with d.c. output of 50 v. when used as a comparator. Stenden Associates, Inc., Norwalk, N.Y.

- **Micromotor.** Miniature 1/30 hp, 6,000-rpm d.c. motor designed for one hour of continuous life in use as guided motor. Motor is 1 1/2 in. dia. x 3 1/2 in. long. John Orr Motor Co., Racine, Wis.

- **Voltage reference.** Constant reference voltage supply converts a.c. into d.c. voltage, maintained within 4 of 1%; for use in d.c. servo systems. Which device is operated from 115 v. 50 to 400-cps input, its output can be adjusted between 0 and 87 v. d.c. Unit maintains voltage within 4 of 1% for load up to 1 m.; for line voltage variation of 50 to 175 v., and load impedance range of -50K to 50K. Unit also supply unregulated 0- and 50-volt outputs. Servo-Tek Products Co., Inc., 1885 Galle Road, Hawthorne, N.J.

- **Control generator.** Continuous two-phase two-wire 400-cps. servo motor and tach (duplex) generator, approximately 1 in. dia x 3 in. long, weighs 7.6 oz. Four-phase motor operates at 115 v., control phase is 30.5 v., controlled. Motor meets a 1.5 gm-cm²,

effort torque at 0.63 in. oz., no load speed is 5,500 rpm, according to manufacturer. When tach generator is controlled from 115 v., it delivers output of 0.9 volt/1,000 rpm, line rail voltage at 15 cps. Output impedance is 600 ohms. Manufacturer is Servo-Tek Co., Inc., 1180 McBride Ave., Little Falls, N.J. • **Frequency multipliers.** Magnetic frequency multipliers, designed to convert 400-cps. 3-phase power into 2,000-cps. single-phase power, have a conversion



efficiency of 75%, according to manufacturer. Model F-10 delivers 5 watts with harmonic content of less than 2%; Model F-12 delivers 25 w.; Model F-11 delivers 210 w. DMR Ltd., 402 E. Cabrera St., Santa Barbara, Calif.

Electric Connectors

Electric connectors, at several sizes and shapes have been announced recently. They include:

- **Rectangular.** Modular, approved Series V-1, available with 7, 8, 14, 16, 20, 21, 24, or 41 contacts, as in a 25-contact rack with a single high-voltage contact. Plating gold and brass are optional. Viking Electric, 1661 Industrial St., Los Angeles, 17, Calif.

- **Circular.** Type E environmental-resistant connector, designed to withstand thermal shock, moisture condensation and extreme vibration, is first of its type to be approved under MIL-C-50155, according to its manufacturer, Scientific Methods Division of Bendix Aviation. Scientific says connector proving is accomplished without use of jacking compound. Address: Bendix, N.Y.

- **Single-line test pads.** Series PHL, 5716 in. dia., for use in bringing out a single connection, such as an test pads, is available in any one of three different molding compounds, from DuPont-Aquacel, 45-08 Northern Blvd., Long Island City 1, N.Y. Feedthroughs similar plug, installed in a high dielectric material to permit 500-ohm non-conductive wiring and a breakdown rating of over 5,000 v., is available from M.W. Kellogg Co., Chemical Metallurgy Div., P.O. Box 465, Jersey City 3, N.J.

If Your Government Contract...

... of Your Regular Product

Requires MANUALS

• OPERATIONS
• SERVICE
• OVERHAUL
• PARTS CATALOG
• TRAINING

Call in the McGraw-Hill Technical Writing Service

Whether you need one or a set of manuals, manuals and illustrated profiles to meet Government specifications or whether your products are such that instructions as their proper installation, operation, and service must be provided — Technical Writing Service can do the job for you. Efficiently... Economically... Satisfactorily.

Technical knowledge and writing skill are the backbone of our service.

Write or Phone

TECHNICAL WRITING SERVICE
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Tel: GRamercy 4-3800

New Avionics Testers For Production Line

A subset tester, designed to auto-automatically test through a series of tests on a piece of electronic equipment, sounding an alarm when it finds a fault, is one of three recently announced devices available for production-line testing of avionics equipment or devices. The others are:

- **Automatic product tester**, capable of performing up to 490 individual automatically sequenced tests, such as continuity, leakage, voltage, resistance, impedance, gain, phase relationship, at frequency response, at the rate of several checks per second. Device proceeds through sequence of tests, stopping and indicating when results fall outside all allowable limits. Called the "Stop-tester," device can be quickly changed to test different products by plugging in different patch boards. Supertester is manufactured by Cole-Cloutier Inc., 911 San Carlos Ave., San Carlos, Calif.

- **Expanded scale voltmeter**, for directly measuring intermediate sizes of transformers, capacitors, and resistors, having primary and/or secondary coil sizes of 37 to 115 v. Accuracy is 0.1% of input voltage, input impedance is 10,000 ohm/volt. Manufactured by Argo Div., Beckman Instruments Inc., 275 Parkside Ave., South Pasadena, Calif.

- **Electronic tube checker**, designed to test all commercially available types

types, both internal and external cavity construction, for presence for individual



tion from external RF measuring ring up work. Manufactured by Industrial Electronics Corp., 106 Metropolitan Ave., Brooklyn 11, N. Y.



- **Digital Computer Turning-Height Aircraft** is expected to take off one of the major lines in electronic reference digital computer work in a paper to be given May 22, during the national tri-state of Radio Engineers convention in New York.

- **New Precision Rectifier-Bridge Avionics** Rad Shack Division has announced a new full-wave, high-voltage, precision rectifier, JAN 9901, pro-

ducing type tube which employs only one to be accurate at altitude up to 80,000 ft. New tube designed to replace conventional 65A or the 65AW, a v. low-voltage audio indicator tube 4) beam

- **Servomechanisms, Inc., Espalero-Servomechanisms, Inc.**, producer of an's systems and components, has recently acquired a wholly owned interest, Industrial Electronics of Canada Ltd., Toronto. In addition to its existing line of electronic test equipment and training devices, the Canadian company will produce Servomechanisms-designed servo systems and components.

- **Growing Computer Role-Evidence of the fast-growing role which analog and digital computers are playing in aircraft design can be found at Douglas Aircraft. Three years ago, company had less than 500 sq ft of floor space devoted to computing equipment; today its computers occupy 12,000 sq ft.**

- **GE Cuts Fuselage Tube Prices-Price reductions averaging 20% have been announced by General Electric on 25 of its 32 high-strength Six-Star types of aluminum alloy. Most is attributed to mass commercial use of tubes originally developed for atomic and military uses.**

- **Aviation Bulletin-Recently announced publications of interest to persons in the aviation field include the following:**

- **Statistical Analysis and Reference**, in a new edition, published by McGraw-Hill, 1221 Ave. of the Americas, New York, N. Y.
- **Minimums and Maximums**, in a new edition, published by McGraw-Hill, 1221 Ave. of the Americas, New York, N. Y.
- **Classifications of the most important types, at a variety of sizes and shapes, are described and applications engineering data is given in a new 50-page catalog prepared by Stephens-Crosman & Manufacturing Co., Leominster, Pa.**

- **Relay Catalog, No. 127**, describing a variety of relays, including 400 type, a new relay, contains point contact, and super-miniature types, is available from Potter & Brumfield, Farmington, Conn.
- **Electronic equipment, including test units, tape amplifiers, amplifiers, and test equipment, is described in booklet 1-6181 available from Westinghouse Electric Corp., Box 2000, Pittsburgh 10, Pa.**
- **Electronic products and computer, Remington Rand's current type catalogue, is described in booklet 124-192, available from the company by writing to 315 Fourth Ave., New York 10, N. Y.**

- **Photo recording technique for use with microfilm tape is described in a new 16-page manual available from the Tech-nical Sales Dept., Allen B. DuMont Laboratories, Inc., Clifton, N. J.** —EPE

FINANCIAL

1953 Market Fluctuations of Leading Aircraft Companies

Company	1952 Range		From 1951		Increase or Decrease	Percent Increase or Decrease
	High	Low	1951	1950		
Boeing	100.0	0	14.14	0.62	5.06%	533.75
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200.0	12.50	14.14	20.74	0	0
General	100.0	20.74	0	0	0	0
Continental	0.75	0	7.50	0	0	0
Boeing	100.0	0	14.14	17.14	0	0
Continental	0.75	0	0	7.50	0	0
Boeing	100.0	0	14.14	7.50	0	0
East	200					



SWITCH PANEL controls variable intensity lights at Stapleton Field, Denver.

Denver Gets Bright Light System

A powerful new lighting system visible to airline pilots 180 miles away has been installed along the 10,000 ft east-west runway at Denver's Stapleton Field.

Ted McKee, chief controller of the Civil Aeronautics Administration tower at the municipal airport, says the lights "will prove valuable any weather bent, enabling pilots to land safely under extreme conditions."

The new lights can be taken from their lowest intensity to their highest brightness in seven seconds—about twice as fast as other types, according to Robert Weeks of Denver's engineering staff, who designed and supervised the installation.

The lights are so continuously in they get brighter or dimmer, according to the thing which is seen. Under the old system at Stapleton, the lights would go out momentarily as they were brightened or dimmed. Furthermore, standard airport lighting consists of one of the five types, permitting 1, 3, 10, 30 or 100 ft of maximum visibility.

First of all they had to be installed at one airport, the lights were developed and manufactured by Erie Marine Co., a division of McGraw Electric Co., Milwaukee, Wis. CNA paid approximately \$68,000 of the total cost of the \$70,115 project.

► **Bi-Directional**—There are bi-directional controllable beam lights. The 500 watt lamps produce a maximum of 750,000 beam candlepower per light. There are 51 of the lights, approximately 200 ft apart along each side of the runway.

Along the first 1,500 ft at each end of the runway, the lights are half close to indicate end of the runway to the pilot, landing or taking off.

Light intensity can be increased in seven seconds from a low of 500 candlepower to the 250,000-candlepower maximum each by the tower operator, who manipulates a microswitch. This permits extremely precise control of the intensity. It decreases "stepped" or "step" in the advance of the intensity.

► **Intensity on Demand**—The tower operator from the lights at the intensity requested by the pilot as he lands or takes off.

For a pilot's convenience on the problem of quick communication with the tower, says Capt. Robert's view is story below.

A 24-line induction voltage regulator was installed on the main transformer vault in the airport administration building. It carries 7,500 v and feeds it to 12 distribution (5 line) transformers in the field. Each transformer feeds from 9 to 10 lights.

The multiple circuit in each 17 m of cable. Cable is buried, except under roads the runway where it is carried in ducts.

Voltage regulated upon lights from the field transformer regulates the duration of the beam. The bulb sets in two pre-set sockets attached by lever arm to a bi-metal and compensating thermometer. The voltage is measured across the bi-metal element, causing the light to move in a 7.5-degree arc and having the beam in a 15-degree arc. Ray box lens are used.

The thermocouple compensates for the increase or decrease of the ambient temperature within the light housing to give true control at all times.

► **Sounder Beacon**—A switching system of three or four contacts at each of the 12 field transformers permits quick re-



HIGH INTENSITY light can go from 900 to 210,000 candlepower in 7 sec.

direction of the lighting in the event of failure, Weeks says.

If the primary fixture should default, the runway can be placed back in service within a half hour by changing and opening the proper air contacts. The secondary side of the transformer also is fused. Transformers are mounted on a concrete pad in manholes 60x7 ft.

Works says the airborne intensity lights from the east-west runway were moved to the northwest-southeast run way, replacing similar lights. Those flash-type marker lights were placed along to the Denver Traffic Engineering Department, which has installed them to mark concrete slabs and traffic obstructions in the business district.

Pilots on Lights

Agently extreme lighting and airport illumination recently got a going over by the man who uses it the most—the airline pilot. Consensus of opinion there is considerable reason for representative.

The pilots were more given recently before the Committee on Aviation Lighting of the Illuminating Engineering Society (November, Winter, 5, 1953, p. 189) in United Air Lines Capt. Robert A. Stone and American Airlines Capt. B. C. Robison. Both were making officials for the Air Line Pilots Assn.

Aircraft Lighting

The highlights of Capt. Stone's paper, "As the Airline Pilot Sees Aircraft Lighting," follow:

► **External Lights**—These are two types



Revere control instruments have shown the responsibility and achievements of the aircraft industry since 1929 with years of dependable performance under all types of weather conditions. Today Revere is recognized as one of the foremost producers of precision instruments. You'll find them installed in many world-famous airplanes.

Extensive research and development facilities coupled with precision production methods contribute immeasurably to Revere's reputation for highest quality control instruments. Contact Revere's field engineering department today. Let qualified engineers assist you with your liquid or electromechanical control problems . . .

FLUX FLOW SWITCH

Recently designed by Revere to use in the position fuel flow of the McCulloch F24 D helicopter, conventional lighter. This means most accurately a measuring signal whenever fuel flow falls below a predetermined value. Send for Bulletin No. 1440.



FLUX FLOW TRANSMITTER

The Revere Fuel Flow Transmitter is an integral part of the fuel system. It reports the rate of fuel flow in the fuel line of an engine. The flow indicator can be used on piston engines, turbos, or jet engine applications. Send for Bulletin No. 1430.



LEGIST LEVEL SWITCH

Revere's R-448 Level Switch, for 1000 Gallon tanks is used to indicate when the tank is full. The level switch is installed in the fuel line. This level switch is used on piston engines, turbos, or jet engine applications. Send for Bulletin No. 1420.



ROCKET SWITCH

Revere's R-448 Rocket Switch is used to indicate when the tank is full. The level switch is installed in the fuel line. This level switch is used on piston engines, turbos, or jet engine applications. Send for Bulletin No. 1420.



SEND FOR FREE BULLETINS!

REVERE CORPORATION OF AMERICA
 WALLINGFORD 2, CONNECTICUT, U.S.A.
 precision instruments for aircraft and industry

Engineers: Build your own future...

... by working with North American Aviation—a company with 35 years of engineering and experience. The Engineering Department has challenging openings for engineers with aircraft experience for recent grads... for men from other fields with adaptable experience. Long range projects assure your future. Openings now in:

STRUCTURAL DESIGN
SYSTEM ANALYSIS
DESIGN REVISIONS
AERODYNAMICS
ELECTRONICS
QUALITY CONTROL
SPECIALIZED IN ALL MAJOR
DEPARTMENTS

Licensed and certified engineers

WRITE TO:

**North
American
Aviation, Inc.**

2401 S.
Channing
Pasadena 10, Calif.
Engineering Office
Pasadena 10, Calif.
Personnel Dept.
Los Angeles 44, Calif.
Sales Dept.
Indianapolis 16, Ind.



NORTH AMERICAN AIRCRAFT HAVE AIRPLANE
THAT ANY GOOD COMPANY IN THE WORLD



GERMES light: 90 in. on a clear night.

of exterior lights on an aircraft—those which illuminate the exterior of plane itself and those which cast it brightly out to other pilots.

First type lights illuminate wing leading edges to check on air accretions during approach or arrival from clouds. These "ice lights" are usually sealed beam units in the sides of the leading or trailing. They have proved satisfactory, according to Stone, except that "all too frequently the light is not focused in the right place and the leading edges are dark. There is a well-founded suspicion that the lights are being focused to illuminate the top of the wing rather than the leading edge in order to provide light for ground crews to service the airplane."

Stone suggests that aquatic lights be provided for the ground crew.

Outside illumination is also used to show light on.

• **Engine assembly to check for oil leaks and vibrations.** Proper observation of

the latter is important in establishing a correct analysis of any trouble which may occur. Stone suggests that it might be possible to design a light which would simultaneously illuminate leading edges, top surfaces of wings and nacelles.

• **Loading gear to check if it is properly extended.** It also helps to check any condition to make sure nose gear has blown out. As Stone points out, many places now flying have small spot lights in the wheel wells. But all aircraft are not so equipped.

Retro-reflective leading lights which are contained from the underside of the wing (the most prevalent type) have a serious shortcoming—they cannot be viewed at high altitudes. Stone says the motion which caused them to glow the lights on against a heavy or no background, reflecting the pilot from wing tips to observe weather ahead unless he refrains from looking downward.

Also, pilots like to turn leading lights to serve as identification when approaching from aspects at night.

Stone also noted that with high-speed jet aircraft, if a light under one wing reflects and the other does not, the aerodynamic aerodynamic forces may cause the plane to tilt violently.

Other drawbacks with current leading lights cited by Stone is their tendency towards isolation when used in narrow situations or in a bank. This isolation tends to blind a pilot facing him to have light off until he is practically on the runway.

When using at night pilots often want to see to see side of the nacelle or the other to locate instrument, but leading lights show freely ahead during little or no good at the other end.

• **Identification.** Lights-identification lights on the outside of the airplane should serve these three purposes, in this order of importance, says Stone.

• **Primary purpose of the lights is to let other pilots know whom you are quickly, positively and at sufficient distance to avoid unreasonably violent evasive maneuvers.** A leading light does this best, according to Stone. The flash rate serves momentarily to identify the light and the red color is desirable because it is traditional danger signal. Menzies, when flying through clouds the red reflection is less distracting than white.

The flashing light should be placed on the aircraft that it is visible from in every angle as possible. The top of the vertical fin seems to fill this requirement best. Also, he believes mounted well above the pilot's normal line of vision. It does not look like Main.

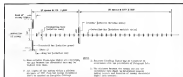
Stone says that the best anti-collision light ALPA has seen so far is one made by the Glimmer Manufacturing Co. (Aviation Week, April 8, 1958, p. 74). The light, which consists of a bulb

shaped vertically on a "V" shaped, so that, when used, it being installed on vertical fin tips by several corners, among them, United, Air Lines and American Airlines. Rotation of mirror around light appear to flash as it passes observer's eyes. Stone adds: "The entire mechanism is enclosed in a transparent and clear and it is necessary to note that the diameter of light by the red color makes it self-illuminating since it becomes quite white when on use." Stone reports that the light has recently been seen at angles of 45 in. and at least once it was seen in far as 90 in. away on a very clear night. This long range is of major importance as the speed of aircraft (and therefore the speed at which they close) continues to increase.

• **Secondary function of exterior lights is to tell the other fellow what you are doing.** The UAL caption notes:

"Current aircraft, say, mount a 'Glimmer' type array of flashing red and green warning lights alternating with white light on the fuselage and coordinated with alternating red and white tail lights. Hence, says Stone, these four bearings from sailing vessels. He adds that the example have been built in providing facilities to test new lights and conducting flight tests and conferences aimed at improving lighting."

Speed of flashing is being examined



ALPA CENTRALINE approach lighting system—the so-called "configuration A"—is seen in a bag day forward toward side and rear leading of aircraft.

Airport Lighting

Capt. Robert's paper was entitled "Current ALPA Point of View on Runway and Taxiway Lighting." Highlights from his presentation follow:

• **Runway & Taxiway Lighting.** Capt. Robert finds it to be observing that although millions are spent on pilots directly associated with instrument approach and landings, pilots have not yet been provided with a built-in, constantly operating, weather-aiding device.

Result: The pilot cannot see the runway lights and the approach is a failure.

Robert proposes the forthcoming

from 40 to 50 cycles per minute. This helps, but still leaves much to be desired, according to Stone. Another trouble, he says, is that one set of lights is a general for the two pilots, make the plane conspicuous and define its course and attitude. Also, requirement as these lights on which pilots are in automatic approach, they are not pilot, a that they must be visible. The increase in brightness is detected not only by speed increase. Another factor making the more responsive is that the brightness of the approach lights does the wing tip lights to the pilot's eye. But if he is properly to determine what the other plane is doing, they have to be brighter.

• **OH test importance as the effectiveness of the type of approach lighting is looking at, according to Stone.** Just a bit of window dressing," he says, that it would be hard to know, if it could be done easily.

Stone, once a pilot on the back to the Civil Aeronautics Administration's Technical Development and Evaluation Center at Indianapolis where much of the coordination work on improving aircraft lighting has been done. Stone says that the example have been built in providing facilities to test new lights and conducting flight tests and conferences aimed at improving lighting."



**Read Control Cable
Tension...in Pounds,
with the New T-60
STURGES
TENSIMETER**

MADE ACCURATELY WITH CORRECTION
Improvements developed through 30 years' instrument experience, supplemented by suggestions of flyers and maintenance personnel. Every read-out indicates accurate tension directly in pounds. New design permits easy access to control wires and built-in built-in wire release instrument check is seen.

UNIQUE USE
The new T-60 is suitable for use on both primary and secondary cables. Two terminals from 1/8 to 1/2 inch diameter. No other design the instrument.

MEASURES CABLE TENSION
The new T-60 (shown) are available to measure tension from 0 to 150 lbs. but secondary cables up to 2000 lbs. per primary cable.



WRITE FOR CATALOG

Pacific Scientific Co.
1020 Buena Vista Ave., Los Angeles 23, Calif.
2000 Buena Vista, San Francisco 4, California
1512 1st Avenue, Seattle 4, Washington
1001 West Alhambra, Alhambra, California
ALSO REPRESENTATIVE AND EXPORTING IN
ALSO IN N.Y., participate in the same

From Sea to Sky

Captain Stone, in his paper, says that the flow-down of the B-26 Superfortress, debriefed into the basis of aircraft lighting and came up with the idea of low-level light. Reason why aircraft lights must be visible from dead ahead is 110 deg overhead is because these angular effects are required by the very time sense. This is true, however, but the fact that making ships could take two points into the wind. So lights had to be visible for 90 deg plus the two points which adds up to 120 deg. Here the 1125 deg slipped to 110 deg in not clear.



Ampenol's strength manufacturing today build planes that have capabilities thought impossible just a few years ago. A large part of their success has been due to the application of more and better electronic equipment in each new model. But the use of this additional equipment has created new problems for aircraft designers, particularly those of space and weight.

One answer to these difficulties is the miniaturization of electronic equipment, and working on the components that have been the engines of airplanes. From their engineering skill have evolved many of the new components needed to add new potentials to efficiency—miniature, removable connectors and cable assemblies. These compact electronic assemblies have helped solve many of the problems created by the trend toward miniaturization.

Ampenol, is the world's largest single source manufacturer of approved A-N connectors, D-P connectors and shielded cable. At your service to assist you with applications of these components is the Ampenol Engineering Consulting Service, who will also work with you in the modification of AMPHENOL equipment or the design of totally new units to your requirements.

AMPHENOL

AMERICAN PHENOLIC CORPORATION, MADE 50, VICTORIA

the individual light's beam.

Robson is against variable focus. He thinks the complexity and possibility of failure to operate just when it is most needed offsets against variable focus lights. This, a good, not too sharp average focus and stick to it, he asserts.

On the other hand, he strongly favors instantaneously variable intensity lights. To be of real value, the lights must be automatically variable, but how to accomplish this is a puzzle, Robson admits, since, as he says, "To assure that a needed signal there will always be a 'red channel' at the very instant when the pilot wants the light is deemed to be the impossible." In actual, he suggests that it would be more logical to establish separate, fixed light control mechanisms for day and night conditions.

► **Fixing the Tailwind**—Robson points out the problem a pilot has in finding his way around large, poorly lighted airports at night. It even has ways to improve it, but it's not too simple, he says. "It's the pilot's job to watch the active runway, glancing up glances wanting to land behind him. A pilot wants an unobstructed light combination which lets him clearly where the runways are, several hundred to a thousand feet before he gets there. And it should be remembered that he is traveling up to 100 mph, and is being exposed in crossing airports, seeing that they are properly checked before, keeping the plane lined up with the runway, watching gaps plus several other things.

► **Stay on Target**—Next problem is to stay on the runway, which can be difficult if it is not properly lighted. Robson speaks quickly at short pilot reactions to pilots who drop which off runway into the variable field and "Two suggestions to help keep pilots on target."

► **Rightly**—Blue lights speed color check together.

► **Coordinate** painted in yellow to distinguish the runway center stripe from white stripes on runways.

Finally, Robson pleads for large, hand placed, movable, painted runway signs, black lettering on a three white background. Signs should be large for easy reading, highly placed to be easily seen from high altitudes, new able to accommodate problems of new runway, etc., and painted overall as electrically lighted houses painted signs are so simple and require no extra wiring.

Electric signs mean more than the expert's electrical system and since that are more complicated and expensive, you get more electrical signs than painted signs for the same amount of money, he says. Robson passes the sign to Boston's report.



AMPHENOL: flexible duct connector solves EMI problem in Conestoga superhighways duct.

Non-Metal Connector Solves Duct Problem

Ampenol Rubber Co. reports it has solved a serious electromagnetic pickup for Eastern Air Lines with a new non-metal high-temperature duct joint.

Eastern reported frequent failure of the flexible metal bellows installed in superhighway inlet ducts of their Conestoga, due to fatigue induced by vibrations and torque motions.

Although silicone fiber glass joints at that time were not approved by the Civil Aeronautics Administration for such applications, Ampenol developed a new coupling, fabricated of multiple plies of a silicone rubber impregnated glass fabric which the firm calls Ampenol.

► **CNA Approval**—These couplings use couplings without CNA for test requirements and were approved by the CAA for use in this application. The test was tested by the Lockheed engineering mechanical research department test group.

Ampenol Rubber Co. believes this is the first instance of a silicone fiber glass flexible duct connector being approved by the CAA for use as a high speed and low-pressure test acceptable for use in fire tests 1, 2, and 3 in an aircraft engine application.

The company says the couplings also withstand extreme low temperatures and retain their flexibility down to minus 125°.

"It appears at this time that this type of silicone fiber glass flexible coupling opens up new design possibilities of joints to aircraft engines for applications where flexible couplings subjected to high temperature and extreme low temperatures are

WHY USE QUICK-COUPLING CONNECTORS FOR THERMOCOUPLE CIRCUITS?

TO SAVE TIME!

Frequent making and breaking of thermocouple circuits can take a lot of early time. However, if you use T-E plug-and-jack connectors, a circuit can be made or quickly and easily as plugging in a cable.

Electrical contact is established through polished elements which are made of thermocouple materials. Your choice for use will be: Iron-Constantan, Copper-Constantan or Chromel-Alumel (Thermocouples). To maintain good electrical connection, the metal plug and jack provide both long wiping surfaces and spring loaded contacts. The connectors have screw terminals, insulated case, colored and marked to indicate coloration.

Interested? Write for Bulletin 23-C.

WHY USE CONNECTOR PANELS FOR MULTIPLE THERMOCOUPLE CIRCUITS?

TO SAVE TIME!

By connecting all thermocouple circuits through control panels, such as T-E's connector panels, you can save time in 3 ways: (1) Check instruments or thermocouple circuits from one or more centrally located distribution panels. With plug-and-jack connections, test instrument is easily and quickly brought into any circuit. (2) From multiple thermocouple circuits. The panel's quick coupling connectors permit rapid making and breaking of instrument and "single circuit, eliminate wiring time and avoid miswiring polarity. Panel distributed makes 120 connections, 36 thermocouples. Bigger at smaller panels, if you want 'em.

Interested? Write for Bulletin 23-C.

Representatives: Thermocouples • Precision Tels • Quick-Coupling Connectors • Thermocouples and Extension Wires • Bulkhead Units • Connector Panels

Thermo Electric Co., Inc.
SADDLE RIVER TOWNSHIP, ROCKHILL PARK POST OFFICE, NEW JERSEY
IN CANADA—THERMO ELECTRIC (Canada) Ltd., WILMINGTON, ONTARIO

Valve Tak

for WM. R. WHITTAKER CO., Ltd.

by Morris Allen,
Senior Member, Aviation Writers Assn.



The new Douglas DC-7 is labeled the "world's fastest propeller-driven transport" and it's easy to believe when you see New York's lifeworld runway breathy you just six hours and thirty-eight minutes out of Los Angeles — nonstop.

The margin of difference between the standard DC-6B and the "newer," of course, is the Wright R-3350 turbo-propeller engine developing 3250 horsepower on takeoff to give the new Douglas ship a total of 13,000 horsepower, a cruising speed of 345 m.p.h. (50 m.p.h. better than the DC-6B) and a top of 410.

The comparative operational differences are quite outstanding, showing the DC-7, even a bare, is far faster than Britain's fastest jet Comet 1.

Take the flight from London to Johannesburg, South Africa, for instance. In the first place the Comet route by way of Rome, Cairo, Khartoum, Entebbe and Tripoli is approximately 6023 when the route schedule) whereas a more realistic route for South African Airways shows a DC-7 (London — Durban) period of five, by way of Rome, Khartoum and Nairobi — a several hundred miles less.

This is most points up the advantage of using a language aircraft that is not compelled to make numerous refueling stops as does the hungry Comet 1.

The comparative figures show that if back in DC-7 and a Comet 1 take off from London in 10 p.m., the Comet will arrive in Johannesburg at 1:45 p.m. (local time) the next day and the Comet will have a 10-hour 50-minute 2:40 p.m. 57 minutes later.

Thus, while the Comet will cruise at 345 m.p.h. (London to Johannesburg) for an average block speed of 324 m.p.h., the DC-7 will cruise at 365 m.p.h. on its fastest 10-hour 50-minute (LHR) with an average block speed of 326 m.p.h., yet both the jet and the turbo-propeller at 51 minutes by virtue of longer legs (with fewer refueling stops) and fast three-hour refueling stops.

This alone is remarkable, but when you add into the comparison the fact that the Comet 1 series only 38 passengers in against 62 passengers for the heavy Seven and 64 for the youth version (only 16 minutes slower in Johannesburg than the Comet and about) you can readily see that Douglas has come up with a terrific package.

And if you want to be sure you know, compare the Comet's direct operating cost per mile with the DC-7's cost per mile. The latter is 4 cents less for the London-Johannesburg run with 8,250 miles for the 62-passenger DC-7 and 1,200 miles for the 38-passenger version.

encountered and where couplings are required in locations as narrow engine compartments where CAA-approved fast-install and finger-pull materials are a requirement," the company reports.

After withstanding 2,500F short bursts for 15 min, the coupling under test was flexed and vibrated vertically and pressure was increased from 33 psi simulated operating pressure up to 55 psi with no leakage.

The coupling also was tested under simulated operating conditions with an airflow of 70 lb per sq in. of 2500F at 13 psi. Further tests of a more severe condition, where the 2,500F flame was applied with an external flow of air, showed the joints to be withstood the test even when there was an internal airflow to conduct heat away from the outer surface of the couplings.

Cost is Low—Aerospace's eye cost of the new coupling is much lower than that of flexible metal bellows type construction ordinarily used in similar applications. Drive advantages listed include lightweight construction, metal alloy as desired, any degree of flexibility required and ability to absorb vibration and withstand bending and torque motions.

Installation is simple, the company says, with no special tools required. The part usually is installed by means of standard strap type hose clamps.

Types are available which withstand pressures as high as 150 psi and over.

New Camera System For Radar Records

A new camera system, featuring a high degree of auto synchronizability, to photograph oscilloscope images in various modes of operation, has been developed by the Bell Telephone Laboratories.

The system, named for Bell's 0-16, replaces the now obsolete 0-15 camera system, according to the manufacturer. It operates with 50 mm. film.

Makeup—System is made up of three main units:
• Type 0-16: Data recording.
• Type 0-21: Medium speed (intermediate recording).
• Type 0-22: Low speed (intermediate recording).
• Type 0-18: Radar scope image record etc.
• Type 0-32: Radar scope image-optical target.

Each unit is made up of three main components: body, power pack, and film magazine. Power packs and film magazines are identical. Bodies differ but have many interchangeable parts and assemblies to simplify maintenance and spare parts stocking.

Two power packs are provided—an

electrical pack for normal installation and a mechanical pack to be used if electrical power is unreliable.

These units of film magazines are provided. The 100-ft capacity is the most commonly used and is the only one which fits the 0-16 unit. Other magazines are available in 200-ft and 400-ft capacities.

Operating Features—Other features of the Bell 0-16 system are:

- **Lightness** for airborne installation.
- **Power** is internally supplied by an electrical motor-spring drive system. This eliminates variation in operational speeds caused by voltage fluctuations. It also provides very fast starts.
- **Strong bodies** of the camera are of a rugged design to withstand high air velocities and high-amplitude vibration encountered in aerial combat.

The 0-16 system was developed through joint research by the Bell Corp., 100-118 St. New York, and the Air Force's Research and Development Command.



Safe Simplifies NAL Ticket Cash Handling

Use of the Modern Safe Co. Cash O-Matic unit saves National Airlines 180 minutes monthly at its New York Post-Side Airlines Terminal ticket counter, the safe company announces. Now, each of the 11 agents at the counter keeps his change fund in his own individually locked metal deposit compartment 10 of which are arranged in the upper half of the specially designed safe. Each box is designed to hold \$50 in coins and bills.

The unit is easily visible through the transparent plastic box which is added to protect coating. If an agent fails to replace a box in the unit, an easily seen red light signals the next coin.

Coin and bills of each day's receipts are put in a special coinage wrap per carrying an automatic statement of



ELECTRICALLY HEATED
PIVOT (AIRSPEED) TUBES

AERO INSTRUMENT CO.

3103 Breslin Ave.
Manufacturers of electrically heated aircraft parts
since 1922

FOR YOUR "AN" OR STANDARD

STAINLESS STEEL FASTENERS

For quality and delivery

Aluminum fasteners meet the rigid requirements of the Aviation Industry. All types and sizes, "AN" or "STANDARD", in stock. Delivered through Domestic and Foreign branches. Complete facilities under one roof ensure prompt delivery.

WRITE FOR CATALOG #2



MANUFACTURERS SINCE 1929
ALLMETAL
SCREW PRODUCTS COMPANY, INC.
831 Stewart Ave., Garden City, N. Y.

BURNS AERO-Tourist Seats

Sturdy, handsome...and comfortable!

Passenger comfort and eye appeal...easy installation and the ability to "take it" in hard Air Tourist service—your assurance when you install Burns Aero-Tourist seating equipment!



Burns Aero seats are among the lightest ever designed...CM steel reinforcement keeps maintenance at a minimum...Continued and reinforced for greatest comfort...Special upholstery...Built to individual airline specifications...Prompt, on schedule delivery...Burns Aero-Tourist seats are in service throughout the world.

Write for details—Airline or Executive aircraft seats.

BURNS AERO SEAT CO., INC.

3999 CONASSET STREET, P.O. BOX 327 • BURBANK, CALIFORNIA

the cabin samples. These are deposited in a special slot whence the money drops into a locked receptacle in the lower part of the safe. Each agent now requires about 10 min. to count and turn in his cash at the end of a shift instead of the 30 min. formerly required. And he turns the small cash box instead of a three-by-two-foot cash drawer.

Automatic Selector Announces Flights

Denver flight department and arrivals at the Municipal Airport here set an automated, automatically set, selector system similar to that on use here.

The selector board is installed at each of the new gate-city stations. Loudspeakers in the terminal and the exterior scope carry the announcements. Ticket agents can back into the network at any time and make emergency announcements.

Each of the Gay airlines—Continental, United, Frontier, Western and itself—has been allotted space of the 1-to-100 conclusions to meet its needs.

OFF THE LINE

New York Air Brake Co. has opened sales and service facilities at the West Coast equipped to handle hydraulic and vacuum pumps made by NAB's Kearney & Winterson division. The branch has facilities to overhaul and test pumps of any size made by the company. Hydraulic testing facilities will be available to run and calibrate State-approved aircraft hydraulic pumps. A well-stocked stock of most of the two divisions' pumps will be carried for samples and test conditions. The West Coast branch, at 5853 Van Ness Blvd., Los Angeles, Calif., will cover California, Oregon, Washington, Arizona, Nevada and Utah.

American Airlines is making a technical installation of Hardies Tool and Die's patented Co-Y Mono-Rail seat unit, the company reports. United Air Lines had previously adapted the same installation. (Aircraft Week June 8, p. 89). The 5111-in. seats are made of 60-61 steel alloy with that of the rivetless type of rivetlength below 3,400—A. Hardies's address: 1045 South Bondy Dr., Los Angeles 25, Calif.

Tomacoma Tooling Co. has been appointed exclusive agent for Japan/Australia Maintenance Co., the former firm manufacturer. Covered under the agreement are products used in aircraft involved exported from the U.S. and imported into Japan.

NEW AVIATION PRODUCTS

Synthetic Hose Resists New Jet Engine Oils

Plastic hose made from fluorocarbon resins, which is said to be capable of handling newly-developed synthetic oils used in late design jet engines, is being marketed by Keston Corp., Belleville, N. J.

Company reports have been put through rigid tests to prove its capability to handle such oils under severe jet engine operating conditions. It is noted that the oils were developed as a result of the failure of conventional petroleum lubricants to stand up under the temperature stresses encountered in jet aircraft operation.

They are said to provide the standard lubricating qualities in addition to having low viscosity at low temperatures and good oxidation stability at high temperatures.

The new plastic hose is not able to stand up under the high temperatures reached by these synthetic lubricants. Thus the company faces the accelerated development of a hose incorporating the necessary physical and chemical properties.

Keston Corp., Belleville, N. J.

"Muffs" Protect Ears From Jet Engine Noise

New ear guards for protection against noise common to jet engine facilities and other high-decibel noise production facilities has been developed by David Clark Co., subsidiary of Minneapolis, Inc.

Unit is made in two sizes, one for male and one for female, and is made of a "foam rubber" type for continuous and reliable wear. Company says model protective caps are made of a combination of a soft, developed sound reflecting and sound absorbing plastic that furnish protection from both low and high frequency noises.

Chief features claimed for straightaway sound protection are completely workable, moisture-resisting, adjustably comfortable for long periods of wear, designed for use with all types of safety glasses and hard hats. All units carry one-year guarantee.

David Clark Co., Inc., 380 Park Ave., Worcester 2, Mass.

Stressless Folding Seat Simple to Install

A new model of stressless seat, interchangeable with the Douglas standard model DC-4 stressless seat, has been



Are you one of a select group of aerodynamicists currently interested in boundary layer control projects? The Aircraft Division of Fairchild offers a genuine serious opportunity to such men.

Reconnaissance aircraft...jet bombers and transports...as well as engineering advances on the world-renowned C-119 Flying Boxcar and the new C-125 Assault Transport are coming from Fairchild. Diversified, stimulating assignments like these increase the innovative challenges to Fairchild's team of qualified aerodynamicists.

Genuine country living only minutes away from urban Baltimore or Washington...paid pension plan...an excellent salary with good benefits...an ideal working environment...generous health, hospitalization and life insurance...and the many other benefits of a progressive company add to the pleasure of working with Fairchild.

You'll be interested wisely in a secure future if you take time today to write to Walter Tybols, Chief Engineer, outlining your qualifications. Your correspondence will be kept in complete confidence, of course.

★ BOUNDARY LAYER CONTROL



THE AIRCRAFT DIVISION OF
FAIRCHILD
Aircraft Division
HARTFORD, CONNECTICUT



Aviation Research
Model 1000-A-100
10" x 10" x 10"

**The First Fully Automatic
AIRCRAFT ICE DETECTOR***
AND

SHEDDING CONTROL SYSTEM**

NOW AVAILABLE FOR GENERAL APPLICATION

*Ice detector currently used for F100 engine protection

**Ice detector and Shedding Control System currently used for CF 100 all weather fighter



Ice Detector
10" x 10" x 10"



Shedding Control System
10" x 10" x 10" x 10" x 10"

This system was developed at the Aero/Astronautics International Conference, Sept. 17, 1968, at London, England



Engineers assisted by:

PSC APPLIED RESEARCH LTD.

1450 O'Connor Drive, Toronto, Canada

Specialists in instrumentation for aviation systems

AIRCRAFT DESIGNERS AND LOFTSMEN

We have a number of attractive openings for Aircraft Designers who have an Engineering Degree and from 3 to 5 years of design experience in the following fields: Mechanical Components, Controls and Hydraulics, Airframe Design, Power Plant Installation, or Aircraft Design.

We also have numerous openings for Loftsmen in the production of full size engineering model drawings in the Engineering Department. Applicants must possess at least 3 years of aircraft or related lifting experience. These positions provide excellent salaries for Loftsmen with the above background.

Applicants interested in work at our Boston Engineering facility may send resumes to:

Engineering Personnel Representative
Chenier Vought Aircraft, Incorporated
150 Cassaway Street
Boston, Massachusetts

Applicants who choose the Dallas area may send resumes to:

Engineering Personnel Section
Chenier Vought Aircraft, Incorporated
P. O. Box 3907
Dallas, Texas

over 40% of the torque wrenches used in industry are

Sturtevant TORQUE WRENCHES

Used by Right, Used in Right

- Permanently Accurate
- Practically Indestructible
- Faster—Enter to use
- Automatic Release
- All Capabilities

In 1-1/2 seconds... Job done... Fastest... (All Data from Industry & Use)

Every Sturtevant torque wrench is guaranteed for 100,000 cycles... 100% accuracy... 100% reliability...

Sturtevant Torque Wrenches
100% Accuracy
100% Reliability
100% Satisfaction



developed by Accusmith, Inc.

Designated Model C18, the seat features map-on-type cushions, also interchangeable with the Douglas seat. The seat is folding, incorporating fold down back, folding one leg with automatic leg lock in the folded position.

Construction is of welded chrome-plated steel tubing, with back and bottom pane made of aluminum. Aluminum body angle iron around back and bottom pane with 4-in. leg holds plastic or leather-covered seat/cushion over in place.

The three-piece seat weighs 36 lbs., complete with back, and has passed CAA TSO C25 load tests. The writer says the C18 seat is adaptable for most aircraft.

Accusmith, Inc., Building 615, PO Box 55, International Airport Beach, Miami 48, Fla.

ALSO ON THE MARKET

Diplex, special alloy originally developed for watch escapement, is now offered in springs for timing precision, permanent flame, electrical contacts, optical and motion picture copy record and other products requiring smaller spring characteristics. Steel is heavy high accuracy and fatigue resistant, product is also said to have applications for trigger valves, dampers, and repeatedly in under test for failure from of corrosion-resistant, anti-leakage bearings—Egan National Watch Co., Alhambra 2nd, Elgin, Ill.

India washing spray now comes in normal dispenser. Known as India 3-76, high efficiency through product is used on round and rectangular barbs, reduces heat distortion and through induction increases carrying capacity up to 30%. Other applications include sealing transformers and coil leads, spraying motor controllers, solenoids and switches, and sealing solenoid resistors. Dries in three to five minutes, resists water and chemicals—Inda Sales Co., 26 Rittershouse Place, Ansonia, Ct.

**BETTER
PUSH-BUTTON SWITCHES...**
for a better push-button world

A good electrical product deserves a good switch—and, for push-button types in the 15 to 50 ampere range that means Hetherington!

Fully proved on the toughest aviation and military assignments, these sturdy, good-looking little units are commercially adaptable to almost any equipment where a few extra more for a really superior switch is recognized as being sound, far-sighted economy.

HETHERINGTON, INC.
SHARON HILL, PA.

(Near East Mallway 8844 W. Washington Blvd., Silver City, Del.)



**HETHERINGTON
Switches**

Both push-button and snap-action types
Switch ratings: light, medium, heavy

Panel indicator lights, master and circuit interrupters

Recent technical advances at
HUGHES have created new openings
with exceptional opportunities
for full use of technical judgment
and creative ability.

staff engineer — ELECTRONICS

With extensive background for increasing
responsibility for development of electronic guid-
ance systems utilizing radar, infrared or laser.

aerodynamicist

With experience in supersonic aerodynamics
and the ability to evaluate the performance and sta-
bility of supersonic aircraft.

hydrodynamicist

With experience in design of hydrodynamic
features of underwater weapons and the ability to
evaluate the performance stability of such vessels.

ALL REPLIES MUST BE IN STRICT CONFIDENCE

Hughes AIRCRAFT COMPANY

1100 JEFFERSON BLVD. CULVER CITY, CALIFORNIA

If you meet the above qualifications, and
wish to locate in Southern California, you are
invited to write for further information regarding these
positions. Include your resume, and a telephone
number where you may be reached for an interview.

PLEASE COMMUNICATE WITH QUALIFICATION

WHO'S WHERE

(Continued from page 11)

Changes

Charles A. Gagner has become chief en-
gineer of Aero-Canada's Gas Turbine Di-
vision at Toronto.

Heard Frey is new manager of quality
control at Montgomery Aircraft Co., Van
Nuys, Calif. Also promoted Ray Johnson,
constant thrust inspector, Joseph Kasper,
special assistant to the factory operations
and Edward Wozniak, manager of systems
and procedures.

Gilbert DeVine has resigned as flight test
engineer at Civil Aeronautics Administra-
tion, Region I, to form DeVine Engineer-
ing Service at New York, specializing as a
civil helicopter certification consultant.

Joseph N. Rancetta, Jr., has been ap-
pointed assistant to the operations manager
of Pan American World Airways' Latin
American Division. Norman F. Springer is
new member of PAA's legal staff.

W. W. White has been appointed as staff
superintendent of factory planning at United
Air Lines' operating base in Denver.

William M. O'Brien has become manager
of Fuel Metering Co., Aerojet Engine Di-
vision at Chgo., succeeding W. W.
Wellsman, who has been promoted to
technical affairs manager of the Steel
Division at Dearborn, Mich.

Wilfred Barham is new publicity director
for Carter & Co., New York.

Eva W. Rudenbach has been advanced to
manager of aircraft products sales for Vok-
er, Inc., Detroit.

Wilkes Butler has become purchasing
manager of Republic Aircraft Corp., Farm-
ingdale, N. Y., succeeding Albert C. Wente,
who resigned because of ill health. Other
appointments: Wesley Eys, agent in charge
of the teaching section, Vexcel Sales,
electronic engineering manager.

John E. Morgan has joined Texaco Air-
craft Corp., Dallas, as manager of the new
marketing department.

Charles D. Adams has resigned as chief of
advertising and public relations for Texaco
Aircraft Corp., Dallas, Texas. He will
continue with the captive holder as tech-
nical consultant.

Michael Haddad, systems staff member of
Boeing Aircraft Co.'s Civilian Motor Di-
vision, is now sales manager for Magnetics
Research Corp., El Segundo, Calif.

Ronald H. Collins, former counsel for
CAB's Bureau of Air Operations, has been
appointed counsel for Airborne Helicopters Air-
line in the U.S.

Edmond L. Ryder has been appointed
weather manager and Frank R. Bero, Jr.,
is new chief engineer of Alliantech Aeronautics
Service Co., Los Angeles. Homer J.
Wood has resigned as assistant chief engineer
to set up a mechanical engineering
consulting practice.

William Ray has been named sales
planning manager for British Overseas Air-
ways Corp. R. H. Trench Thompson has
been appointed manager, North America.

Raymond E. Short has become assistant
sales manager for Central Airlines.

McDonnell
Piper
Grumman
North American

Prosecki
Cessna
Boeing

Bill
Boeing
Douglas
Sukorsky
Northrup
Lockheed

Buch
Allison
Goodyear
Balinca

Republic
Curtiss-Wright
Martin

Pratt-Whitney
Texas Engineering
& Manufacturing
Consolidated Vultee



Specify Ostco Aircraft Tubing

Wherever heavy wall tubing is required... select,
specify OSTCO Aircraft Tubing as those manu-
facturers do. Whether your specifications
call for seamless tubing, formed or fabricated,
send us your blueprints for prompt quotation.
Latest edition of OSTCO A-2 Handbook will be
mailed upon your request.

OSTCO MANUFACTURING DIVISION of Ingersoll Rand Company
CHICAGO, OHIO—A Division of the Ingersoll Rand Tube Industry in America

SALES OFFICES
ATLANTA, GA.
CHICAGO, ILL.
CINCINNATI, OH.
DETROIT, MI.
INDIANAPOLIS, IN.
LOS ANGELES, CA.
MINNEAPOLIS, MN.
NEW YORK, NY.
PHILADELPHIA, PA.
PITTSBURGH, PA.
RICHMOND, VA.
ST. LOUIS, MO.
TAMPA, FL.
WASHINGTON, D.C.
WICHITA, KS.
WILMINGTON, DE.
YAKIMA, WA.

SIMULATORS

for the world's leading aircraft

SIMULATORS FOR
THESE LEADING AIRCRAFT
AND DUPLICATORS...



HAVE BEEN SELECTED BY THESE
LEADING AIRLINES AND MILITARY SERVICES



AIRLINE AND MILITARY CREWS CAN FLY ANY
ROUTE, ANYWHERE IN THE WORLD, UNDER ANY
CONDITION WITH ELECTRONIC SIMULATORS

A Simulator exactly reproduces the controls, instruments and response of the airplane for which it is designed. It enables pilots, without leaving the ground, to experience every detail of a flight from anywhere in the world—including weather, take-off, climb, cruise, approach, and landing—through any kind of weather or flight conditions.

Because aerial flight itself cannot equal a Simulator in quickly building up crew experience and coordination, leading airlines and the military services have ordered Simulators for a wide variety of aircraft types. These \$300,000 units pay for themselves by saving time and reducing a crash for service.

Only through electronics is such flight simulation possible. Only Curtiss-Wright, with basic patent rights in this field, and its licensee, build Simulators and Duplicators for both the Armed Services and commercial airlines of the world.

CURTISS-WRIGHT

CORPORATION • WOODBRIDGE, N.J.



LICENSED UNDER BASIC PATENTS OF R. C. DEHMELE AND CURTISS-WRIGHT
BRITISH LICENSEE: REDIFON LIMITED, LONDON
CANADIAN LICENSEE: CANADIAN AVIATION ELECTRONICS LTD., MONTREAL

P.O. Asks More Time for Its Mail Tests

- Seeks Dec. 31 limit for local service experiment.
- ATA pushes air carriage of letters at 5¢ rate.

By Frank Shea, Jr.

Turned toward new transportation of surface and recovered letters last week as a result of new major developments.

- Post Office asked extension through Dec. 31 of Civil Aeronautics Board acceptance to permit handling of airmail by local service airlines at the special 5¢-per-piece scale rate.
- Air Transport Association, legal action to give full support to a nationwide expedited mail program, pointing out in a thorough analytical study its public effects on the industry.
- Tests and Studies—In a letter to CAB, backing the local service carrier's request, Assistant Postmaster General John C. Allen said Post Office is not yet in a position to determine by tests and studies the specific rates at which air movement of surface mail might be economically justified.

Allen points out that if extension is granted, the service will be used in those instances where there would be improvements in present postal service commensurate with transportation charges.

Local service could be used, he says, in emergency instances where movement of surface mail would otherwise be delayed and also where pilot test as desired prior to air to obtain additional data as to the feasibility of expanding rapidly experiment.

"However," he adds, "it is not possible to contemplate that the local experiment will be conducted on the same scale and with the same regularity as the current business experiment."

Allen says the 10-cent rate might be applied to service whenever sufficient data becomes available, possibly before the Dec. 31 termination date.

- ATA Puggan-OK broader scope in AEA's call for surface industry's support of a nationwide expedited mail program, which would include:
 - A straight free-charge-once post-rate for all non-local first-class mail, including expedited airmail for which the present surcharge or differential rate would be charged. Local rates will be unchanged.
 - Raising of all first-class mail by air

P.O. Backs Air Cargo Proposal

Post Office has asked CAB to reconsider its decision of last month in direct competition to all-cargo carrier Skyway, Inc., Flying Tiger Line, Inc., and Republic Airlines to take part in air transportation of surface mail.

The Board concluded that there is no need at this time for participation of non-air carriers in order to assure the success of the experiment.

Stating that the Board's decision apparently was based only on an examination at the New York Chicago and Washington-Chicago airports at rates already prescribed by the Board, but also would make the remainder of their certified services available to Post Office at the rate of 18.6¢ each per ton-mile. Such rates are low and reasonable on an experimental basis, Post Office holds.

that the cost of certified cargo carriers presents an extremely different question.

Post Office says further that experiments are being conducted in order to obtain data to determine if need exists for such mail service not to establish a need.

It adds that granting of exemptions to the all-cargo carriers not only would permit them to participate in the New York-Chicago and Washington-Chicago experiments at rates already prescribed by the Board, but also would make the remainder of their certified services available to Post Office at the rate of 18.6¢ each per ton-mile. Such rates are low and reasonable on an experimental basis, Post Office holds.

when it can be expedited. Decisions would be left entirely with postal authorities. It is pointed out that all first-class mail involving more than 450 sq. in. would be sent by air. A considerable amount moving less than this mileage also would be delayed.

Discontinuance of separate identification of airmail mail from other first-class mail.

Preparation of analytical report on the subject involving a sampling of first-class mail volumes and procedures of large types of business mail, investigation of actual airmail scheduling and transportation analysis with Post Office officials of mail movements and discussions of services, and completion of current studies from CAB and Interstate Commerce Commission.

ATA concluded:

- Adoption of a nationwide system of expedited mail with the straight five-cent rate for a single piece class mail, which in postal revenue increases of \$145 million, with \$10 million at increased costs, is a net reduction of \$135 million in the postal deficit.
- Expedited mail should increase domestic airmail volume by an estimated 117 million ton miles which at prevailing rates, could pay the air carriers approximately \$55 million.
- Railroads will strongly oppose such a program, but believe's actual revenue losses should not be heavy. Domestic should take 79.1% of total mail revenues but only 4.27% of total airmail revenue.
- Satisfactory domestic delivery industry

in a while will have no difficulty in handling the diverted mail with requirements at no time on the former. The future estimate exceeds 31.7% of even experts over all other anticipated traffic needs.

Individual carriers will be able to handle the added mail volume with little scheduling or capacity difficulty.

Large mass of business mail, with few exceptions will not decrease their shipments of first-class mail—including carrier mail—under the five-cent rate.

Better Position—Analyzing the eight five-cent rate proposal from the surface point of view, ATA reasons that because of the possibility of diversion from regular airmail class an expedited mail class in which the surface mail is in a better bargaining position if it is not treated the full rate.

As to its ability if the domestic scheduled airlines to handle expedited mail, ATA concludes that two basic issues are involved.

Capacity of the industry to absorb diverted mail without disrupting its present other service.

Ability of individual carriers to handle the additional volume.

On the first point, ATA says there can be no disagreement as to the ability of the airline industry as a whole to handle the diverted mail unchanged.

DC-7 Flights Running Overtime

American Airlines has been running an average of about 45 min overtime on its scheduled nighttime nonstop DC-7 New York to Los Angeles flights during the first two months of operation.

Only one weekend flight is reported to have made the run on schedule. The Los Angeles-New York half of the service has been running on time.

► **Wahwah-Air Line Pilots** American Airlines says American's use of one crew in excess of eight hours is in violation of Civil Air Regulations, which limit crew to eight hours in a 24-hour period.

It would appear, it says, that the carrier's schedule in this case is unrealistic.

It has been indicated that ALPA has not taken steps with AA to correct the situation, and, consequently, then with Civil Aeronautics Ad-

ministration to cause the company to comply with federal regulations.

► **All-Weather-Operations** holds that the nighttime schedule is based on a two-city weather study and that average flight time will run under eight hours over the course of a year. The airline points out that it is at the most difficult time of year because of the strong prevailing westerly winds.

CAA reports it is "fully aware of this problem and is watching it carefully."

► If ALPA does bring about action, American could be faced with:

- Possibility of having to discontinue overnight service.
- Adding a CAB waiver to permit use of multiple crews on DC-7s.
- Granting of waiver would permit other airlines to do the same, however, and American would lose its competitive overnight advantage.

of the application which the carrier wished to keep confidential and is to file the application.

"Chairman announced that such applications would be taken up at the Board meeting the following morning. Application was filed at 8:51 a.m. on 17. Board considered eight minutes later and approved American's request for exemption by a vote of three to two and adjourned at 9:40 a.m."

Relaying on his statement that the Board action exempts the President, Los Angeles Southern 800 of the air that specifies Board authority in cases of difficulties involving aviation and foreign air transportation is subject to approval of the President.

► **Rights of Housing-Less** are the majority's action violates the rights of carrier and housing.

"This is not the first time the Board has been asked to exempt this statutory requirement which is set forth in both the Civil Aeronautics and Administrative Procedure Acts," the CAB member says.

"But this is the first time the Board has ever yielded to such a request either through written document or oral agreement."

"I am in complete disagreement with the majority's statement that American's present request is of an emergency nature. American has had an air with CAB since Nov. 28, 1947, and its application to consolidate its routes as that it can operate overnight service between New York and Mexico City. This matter has been pending nearly seven years and the Board could have at any time set this matter down for hearing."

"The majority's statement that 'such action is without prejudice to the rights of other carriers' is in amounts to the admission of its own efforts to ignore American's request for exemption."

Los Angeles Southern's action is "superior and drastic" taking the position that it "disregards the legal requirements of the Civil Aeronautics Act, contempt of the President and denies other carriers due process of law—all for the purpose of protecting the interests of American Airlines to Mexico City."

"The action of the majority is approving what amounts to a new route for American. It has been ruled through its board that I have not been given time to prepare a dissenting opinion," the Board member says. "The proposal for this new service first came to my attention in the Board meeting at noon Jan. 16 when the chairman presented American's petition with a covering letter which requested instant exemption."

"At a special meeting . . . the Board denied American's request for service and indicated the committee to return the petition to the carrier and advise American's attorney to delete portions

Copter Air Bus

• LAA chief tells cities to plan now for copters.

• He warns against rules that would stifle growth.

Los Angeles-Claudio Belton, president of Los Angeles Airways, has told Southern California city planners they must prepare now for the arrival of a "new dimension in transportation"—the helicopter.

Belton says community officials must consider the idea that the helicopter is an airplane. "It combines the functions of the airplane, bus, truck and automobile."

► **Expanding Potentialities**—The LAA executive spoke at a forum sponsored by the American Helicopter Society, the Southern California Planning Council and the Los Angeles Chamber of Commerce.

It was the first community-wide effort to explore the possibilities of the copter and the effect its transportation pattern might have on the Southern California future.

Sponsors of the meeting hope it will be the first step toward a requirement for one-way copter planning, similar to the helicopter section of the Port of New York Airports.

► **Protected Air Space**—Belton warns against penalizing a "rule which would limit and restrict" in city order as a result of exemption over the coming air use. "The world will be the growth of helicopter service," he indicates.

He says city leaders to plan for help that the world has available all space provided against encroachment of any kind.

"Each city, town or hamlet can afford to make its air plan a city, 100 ft. by 100 ft. for all the helicopter, particularly a plot of grass," Belton says.

► **Future Service**—The LAA official outlines that pattern of "air bus service," which he predicts will be in operation by the early 1960s.

► **Small towns** will be "one stop" on such a route, he said.

► **Helicopters** will require a landing site close to the center of town with large parking areas for vehicles of all capacities, possible in a shopping center.

He estimates 10% of the population of the U.S. is located on helicopter routes.

► **Transportation**—Belton predicts the helicopter might now use a transportation center similar to the old time rail station.

He reports that LA Airways already has found an in Southern California routes that people are going out to the



our hat's in the jet ring!

More than 3,000,000 pounds of high alloy jet engine rings is a wide variety of diameters and contours were shipped from our ring division last year. Since 1947 Cooper Alloy has been answering the call of jet engine manufacturers to the tune of thousands upon thousands of centrifugally spun high alloy rings, machined close to finish dimensions, X-ray and x-ray inspected, and delivered with the speed and flexibility that changing aircraft requirements demand.

For the full story write today for Bulletin CC-54.

COOPER ALLOY
THE COOPER ALLOY FOUNDRY CO. • MILLVILLE, N.J.
An American Helicopter Society member. Selling products of STAINLESS STEEL, alloys, forgings and castings.

CAB Okays AA Service to Mexico

Approval still is needed from Mexican government for nonstop flights from N. Y.; Eastern flights Board action.

American Airlines, aided by a recommendation from the State Department, has won Civil Aeronautics Board permission to start temporary nonstop service between New York and Mexico City.

But the service still must be approved by Mexico before the carrier can begin competing with nonstop Coast-to-coast flights inaugurated by Air France two weeks ago over the New York-Mexico City route (Aircraft World 25, p. 7).

Zustara Air Lines, assisted by CAA's action, has filed a request for a stay order on the route with U. S. Court of Appeals in the District of Columbia. CAB and American have agreed to postponement of the nonstop service until Feb. 8.

► **97% of Capacity**—Millville, Ala. has increased its coast-to-coast nonstop DC-7 service, starting two-day flights on the New York-Los Angeles route last week and inaugurating New York San Francisco service Jan. 17.

AA vice president William T. Hager reports flybys on the DC-7 flights have averaged 95% of capacity since the service began late in November.

► **Competitive**—American's petition for nonstop Mexico City-New York service, CAB approved the flights as a three-day service based on the "particular circumstances involved."

The majority notes the exemption is

granted "for the purpose of preserving the competitive position of U. S. flag services . . . pending establishment on a long-range basis of a coordinated air pattern between U. S. and Mexico."

CAB emphasizes its action is without prejudice to any other applications, other to file or to be filed, relative to U. S. Mexico service.

Los Angeles Southern's dissenting, Josh Lee states the action is "superior and drastic" taking the position that it "disregards the legal requirements of the Civil Aeronautics Act, contempt of the President and denies other carriers due process of law—all for the purpose of protecting the interests of American Airlines to Mexico City."

"The action of the majority is approving what amounts to a new route for American. It has been ruled through its board that I have not been given time to prepare a dissenting opinion," the Board member says. "The proposal for this new service first came to my attention in the Board meeting at noon Jan. 16 when the chairman presented American's petition with a covering letter which requested instant exemption."

"At a special meeting . . . the Board denied American's request for service and indicated the committee to return the petition to the carrier and advise American's attorney to delete portions



on job after job...
YOU'LL FIND

Snap-on BOXOCKETS

the handiest, safest, fastest
wrenches you have ever used

For fixed on the job... with Snap-on Boxockets... for stronger and more secure, safer than open end or adjustable wrenches! Open heads provide ample clearance on all jobs. Double leverage openings completely remove the over-grip strain on all use. Corrosion-resistant chrome-plated—need require only half the coating space where movement is limited. Each Boxocket provides new wrench sizes to each handle. Complete series covers full range of sizes, 1/4" to 3/4". Other types—Welding, Drilling, Heavy Duty and Snap-on—up to 40". Nylon for Industrial Climbing and General Climbing of 4000 Snap-on tools for professional and maintenance.

Write a dealer nearest you for Snap-on Boxockets... or Snap-on Tools Corporation, Dept. 100, P.O. Box 100, Port Jervis, N.Y. 13154.



Snap-on Tools Corporation
2000 N. Ave. • Kenosha, Wisconsin

Snap-on is the trademark of Snap-on Tools Corporation

belong to "watch the madmen go through"—each as they showed up at the depot in former years to post the aircraft trail.

► **Change a Job.** One-third of all mail cargo flown into Southern California by the airlines during 1953 was handled on Los Angeles Airways, its president asserts. On the heaviest day of 1953, LAA flew 15,812 lbs.

Any device capable of doing a job such as this right now deserves consideration by city planners," Bickins says. He signs them out to put themselves in the position of the commuter who produced in 1932 that air travel between New York and Washington never would be a financial success because of the time train service over that route.

► **Adaptable Service.** The helicopter "air bus" can transport the public with outlying fields for jet transport, thereby eliminating the problems of jet operation over city areas. Bickins points out that it does not need any special facilities. It is equally adaptable to the task of taking travelers from outlying districts to the central stations, he notes.

Bickins says LA Airways will begin its first twice passenger service before mid-1954, but expects it is "absolutely necessary" to have multi-engine helicopter before beginning operation over crowded areas.

ENGINEERS

... FLIGHT TEST
... ANALYSIS
... AIRCRAFT STRUCTURES
WILL CONSIDER
RECENT GRADUATES
IN AERONAUTICAL, ELECTRICAL
OR MECHANICAL ENGINEERING
Salaries & Responsibilities
Commensurate With Exp.

Considerable professional advancement in engineering field commensurate with experience primarily assigned to development, installation and flight test of general instrumentation and flight control equipment. Structural design and stress analysis experience desirable. Positions involve all phases of flight test including preliminary study work, planning of tests, installation of equipment, and analysis of results.

CENTRAL LONG ISLAND
LOCATION AT MEADOWS AIRPORT
IN LONGNECK, N. Y.

Send resume to:
Box 218, Brookhaven, N. Y.
or Phone: RENEWED 9-8086
An Air Force Research Institute
An Air Force Research Institute

SPERRY

GYROSCOPE COMPANY
McARTHUR FIELD,
ROCKYHOLM, N. Y.

Slick Pilots Hit ALPA 'Politics' in Merger

Los Angeles—L. W. Gamble, chair man of the Slick Airways Pilots Assn., accused Air Line Pilots Assn. last week of "using pressure and power politics" in the security dispute that threatens to delay the merger of Flying Tigs Line and Slick.

Flying Tigs pilots are members of ALPA. "ALPA is reluctant to sign the agreement until it is sure of being the bargaining agent for the combined group," Gamble said. "All the Slick pilots want is a fair break for everyone."

► **Agreement Butters.** More than three weeks of meetings between the pilot groups failed to bring an agreement on the question of how members would be compensated. Further meetings were scheduled for midweek in Chicago.

Slick pilots have asked Civil Aeronautics Board to speed the labor ruling on its merger decision. "If necessary," Gamble said, "we will take the case to court."

CAB had ruled last August over an earlier dispute that seemed to "recommend" to integrate the respective membership and of negotiations fail, it "rejects" the plan.

► **Necessary Steps.** In regard to the pilot dispute over security's spokesman for the Tigs said: "We believe that all we have to do is tell CAB we have taken the necessary steps on the labor clause and have recommended that are concerning points in dispute so in arbitration, or suggested by the board. Our responsibility ends there."

Whether CAB will accept this is an other question.

The Flying Tigs official admitted that every action, threatened by Slick pilots, could delay the merger.

Control Loss Seen In PAL Rome Crash

(McGraw-Hill World News)

Rome—Loss of pilot control at low altitude caused the crash of a Panagiotis Air Lines DC-6 crash here Jan. 17 that killed all 36 persons aboard (Aerobase Week Jan. 25, p. 7), a PAL report indicates. The information was forwarded to the airline following an official investigation.

PAL's delegates also reports the DC-6 reduced Company Airport only two minutes before the crash that the flight was proceeding normally.

Witnesses to the crash say the plane's left outboard engine was running unsteadily and was smoking when the transport's nose suddenly tipped and crashed into the ground.

Domestic and effective FLAME ARRESTERS for Ducts, Vents and Dams. Climates... Designed and developed by STAINLESS STEEL PRODUCTS INC. Manufactured in units for your assembly or as a complete assembly including feeding and attaching flanges.

STAINLESS STEEL PRODUCTS, INC.
2300 N. SAN FERNANDO AVE.
BURBANK, CALIFORNIA

Write for literature
or
order today

ENGINEERS

Because of additional contracts,
we are now soliciting applications
for all types
of engineering assignments.

Inquiries invited to strict confidence
TECHNICAL PLACEMENT SUPERVISOR
BOX 104, ST. LOUIS 8, MISSOURI

McDONNELL *Aircraft Corporation*
Manufacturers of AIRCRAFT AND AIRCRAFT PARTS - SINCE 1926

Strictly Personal

If any airline is offering a safer business service than Air France, it has not come to my attention. This writer was one of a group of scientists, newspaper, television and movie people invited by Air France to help organize the new weekly Golden Pegasus Flight between New York and Paris on a Super Constellation equipped with aviation's answer to the champagne throne. Every seat by day, a bed at night, with cocktails, champagne, music, roses and pleasant air is a real deal for an average champion of aviation service for its customer people. It was a comfort to see another all-night DC-4 coach into the states. There is a place for luxury in air transportation, as long as there isn't any more of it than will fly its own way.

Air France flew its VIP party between Paris and Algiers by Comet. It is operating, then, and we flew in two of them. We could check widely catalogued reports about the Super Constellation and the Comet's lack of it. We were surprised how much more pleasant these are on the Comet (thicker nap would help). The music wasn't very good. But the publicity had convinced the passengers that there wasn't anything like a narrow ship available, so we faced the Super Constellation as rivals. So we went to try an experiment with our companies. Robert Mountbatten, a well known customer writer. As a result, we decided the Comet has no monopoly on smooth flying, despite the razor sharp about turns standing on edge (on edge is not rolled) as a table in the Comet "Narrow fuselage, it is in fact a table on a table on the Comet." Notice, then, it is in fact a table on a little quarter inside its cabin than conventional transports, as the other on ALPACON West's staff who have Comets will attest—Robert Mutha, Jr., Publisher, and George Christian, Equipment Editor.

Super Constellation, over the Atlantic, without complaint, but for them one to three or four minutes, and felt not because of vibration but from very slight altitude changes due to air currents. We have Mr. Mountbatten's signed letter attesting to our complete experience "U S persons, adults, dissent, quarters, and various points did stand on edge on a Comet. A 31-year-old man on the French Republic stood on edge (on edge is not rolled) as a table in the Comet "Narrow fuselage, it is in fact a table on a table on the Comet." Notice, then, it is in fact a table on a little quarter inside its cabin than conventional transports, as the other on ALPACON West's staff who have Comets will attest—Robert Mutha, Jr., Publisher, and George Christian, Equipment Editor.

Says on the door of the AIA office in Washington which housed publicity GBO for the 50th anniversary of powered flight. "Only look in 90 years." CAA continues to lose individual sense. In the last six months we see hold these engines have merged volitionally—Johnson, McKee, Book, Field, Carter, Carlson, Stanley Booth, Sandler, Fuchsman and Devore.

Personal cuts are rising in CAA's International Division. The Alameda McClellan Memorial Fund now exceeds \$2,000. Contributions from members of the former aircraft club at Alameda West are to help conduct the education of his three children—now to be sent to Mrs. Gertrude McClellan, 4028 N. Carlyle Spring Rd., Arlington, Va. . . One of the U.S. magazines that has won newspaper headlines here with its stories about Korean planes was criticized briefly by the London Daily Sketch for publishing a story about Britain's Vulcan bombers. When questioned by the Associated Press, the American editor said the original article had been only "an educated guess." Interestingly, American West had been offered the same story earlier, and had rejected it.

—BETTY

AVIATION CALENDAR

- Feb. 15—American Society for Testing Materials, 1954 Committee Work** with emphasis on role of transport materials and design of components, Steelhead Hotel, Washington.
- Feb. 17—27th Anniversary of Sustained Flight**, observed by Link Aviation, Inc., Wilkes-Barre, Pa.
- Feb. 18—Society of Plastics Industry**, ninth annual division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.
- Feb. 18—41st Annual Society of American with annual general conference**, Hotel Butler, New York.
- Feb. 18—American Radio Inc.**, annual convention of Radio Engineers Engineering Committee (open to non-members) Hotel Butler, Washington, D.C.
- Feb. 19-21—American Institute of Electrical Engineers**, winter quarter conference, Ambassador Hotel, Los Angeles.
- Feb. 19-21—Montreal Aeronautics Trade Show**, Convention, Montreal.
- Feb. 19-21—Institute of Radio Engineers and American Institute of Electrical Engineers**, winter quarter conference, Philadelphia.
- Feb. 20-21—Third annual Texas Agricultural Aviation Conference**, Texas A&M College, College Station, Texas.
- Feb. 21-23—Seventh annual National Model Plane Exhibit Contest**, sponsored by Air Foundation and Cleveland Chapter of Commercial, Higher Co. members, Cleveland.
- Feb. 24-26—Ohio-Indiana Agricultural Aviation Conference**, Ohio State University, May 15—Society of Women Engineers, national conference, Mayfield Hotel, Washington, D.C.
- Mar. 22-23—Institute of Radio Engineers**, national convention, Waldorf Astoria Hotel and Kingsbridge Armory, New York.
- Mar. 18—American Management Assn.** (The National Federation of Manufacturers Inc.), Atlantic City, N.J.
- Apr. 14-16—Society for Experimental Science**, symposium, meeting, Netherlands Press Hotel, Cincinnati.
- Apr. 19-20—Symposium on automatic production of aircraft equipment**, sponsored jointly by Standard Research Institute and USAF, Fairmont Hotel, San Francisco.
- Apr. 19-24—National general student paper competition for undergraduates and grad students** sponsored by the "True spirit of US," Midway Hotel, Dallas.
- Apr. 21-23—Joint meeting of Radio Engineers and American Institute of Electrical Engineers**, Institute of the Aeronautical Sciences (Philadelphia Section) and Institute of Radio Engineers (Philadelphia Section), Philadelphia.
- Apr. 23-25—American Institute of Electrical Engineers**, conference on feedback control, Crowder Hotel, Atlantic City, N.J.
- May 4-1954—Electronic Components Symposium**, Department of Interior Building, Washington, D.C.
- May 5-7—Third International Aviation Trade Show**, managed by Airline Trade Show, Inc., The Regency, New York.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—FEBRUARY 1, 1954

ADVANCE ELECTRIC & MOUNT CO. Aircraft Electricals	40	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
AIR CONDITIONING CO. Aircraft Air Conditioning	41	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70
ALUMINUM INDUSTRIES CORP. Aluminum Parts & Supplies	42	STERNER ENGINEERING CO. Engine Parts & Supplies	70	WESTERNER CO. LTD. Engine Parts & Supplies	70



EXTRA PAY-LOAD MILES WITH PASTUSHIN TANKS

External fuel loading with Pastushin fuel tanks adds to safety and gives needed range to economical and business aircraft. Pastushin jettable fuel tanks — the product of long and specialized experience — increase operating radius and effectiveness of military and commercial aircraft alike.

RESEARCH • DESIGN • DEVELOPMENT • PRODUCTION

Design specifications for research, design and development for military and business aircraft. Also available for military and business aircraft.

PASTUSHIN AVIATION COOPERATION

101 ARCADE INTERNATIONAL AVENUE, LOS ANGELES, CALIF.

Trends in Airmail Pay

The Post Office Department, rebuffed with an airmail man drive not seen for years in those somber halls, has taken drastic steps affecting airmail in the 13 months of the Eisenhower Administration. In its campaign for economy, it is definitely manufacturing a negative play on Civil Aeronautics Board, its American Wings analysis shows, which may start another episode on the airmail matters. The real impact on the airlines is yet to come.

Recent last-minute adjustments in the airmail rate structure have been brooding-taking to an transport industry observers, accustomed to a ponderous P.O. of the past 20 years—except for a brief period when Genl. Bellwin, an Assistant Postmaster General, spoiled helicopter mail carriage for metropolitan communities.

Only a few weeks ago the Post Office decided to turn over mail volume, effective Jan. 1, to the carrier with the lowest competitive rate. This started an unexpected stampede by six trunk carriers, formerly on a 55-cent base-rate rule, who wound up requesting and being granted a basic rate of 45 cents, matching the "Big Four."

But there is as question as to the P.O.'s determination to cut the "service" rates paid the airlines. As a result of Reorganization Plan No. 18, effective on Oct. 1, all subsidy payments to the airlines now come out of the CAB budget with the P.O. paying only the designated "service" rates. This change does not disqualify any certificated mail carrier from subsidy payments as long as proper proof can be shown. Accordingly, if any carrier benefits on a higher "service" rate but driven to a lower "service" level becomes marginal in its operations, it may become more dependent for subsidy support from CAB. This may reduce the P.O. budget needs but it may increase the Board's.

For the reason, the Board may begin to resist further determinations of the mail rate structure, in the opinion of close observers.

Prodded by Senate Interstate and Foreign Commerce Committee, the Board more than two years ago made a courageous attempt to separate subsidy from service mail payments for all of the individual airlines. Based on a major study, the domestic lines were grouped into seven classes to determine appropriate class service rates. The competitive service rates varied from 45 cents per ton-mile for the "Big Four" group up to \$7.25 per ton-mile for the local service group.

Significantly, the basic 45-cent rate was declared by the Board to be generated on scientific and detailed data following a comprehensive survey as to the "cost of mail service and costing techniques." A rate thus computed was said to be devoid of subsidy and generally regarded as the lowest mail compensation would possibly reach.

Nevertheless, some trailblazers questioned CAB's determinations, maintaining that 45 cents was too low.

Recent Post Office action, however, seems to have placed the Board's previously well-defined service and subsidy classifications of the airlines in a doubtful position, one financial authority believes. Major revisions appear likely and may stem from the current study of the entire airmail pay structure ordered by the Board.

While the rates may be clarified somewhat by this inquiry, it is felt by those who are best informed on the subject that few conclusive results will be forthcoming immediately.

Another significant test may develop soon in a scrub of the "experience" in flying all first-class mail between Chicago and New York, and Chicago-Washington. This service, being flown by United, TWA, American and Capital, takes a much lower rate, 18.66 cents a ton-mile between New York-Chicago, and 20.04 cents between Washington-Chicago. Since Oct. 6, when the operation was inaugurated, all the mail offered by the P.O. to the participating airlines in this non-certificated service was accepted and none diverted to the mails.

So there has been adequate space available to handle the volume. Through the end of December the four lines carried about 2,694 tons of mail for about \$946,000.

So far, it appears most of the participants in the operation are pleased. The four airlines view these added revenues as gross, since little added expense has been incurred.

Some air transport officials, however, fear the P.O. may utilize results of this experiment to reduce the "regular" rate of 45 cents a ton-mile being paid the carriers for preferential airmail. Any reduction in this rate will, of course, further cut the P.O.'s budget needs.

Not noticed, by any means, is the role, if any, to be played by the all-range lines in carrying mail. None of these holds authorizations from CAB to transport mail. The P.O., however, might expect of these airlines to assist in the "experiment" to carry surface mail by air.

In an interesting 52 decision, the Board on Dec. 1 held that it could authorize all-cargo and noncertificated carriers to fly mail through exemption from regulations. This brought an immediate threat from American and TWA that if that ruling was placed in effect, a court case would be brought immediately on grounds that the exemption device in such instances would be an illegal abuse of power. Less than three weeks later the Board found . . . it does not appear that there is any need at this time for the participation of non-certificated formal carriers in the movement of first-class and surface mail in order to ensure the success of the Post Office experiment.

The P.O. presumably would welcome the capacity available through the all-range lines to carry first-class mail. It would also represent a competitive pressure to those mail compensation even lower.

"The 45-cent minimum may now be in some jeopardy," one observer writes. "All airlines will feel the effect of an adjustment that are made in the basic 45-cent rate. Should reductions be imposed below that level, it may be necessary for corresponding cuts to be made for the entire range of carriers."

Currently, mail compensation is a small percentage of total revenues of most of the trunk airlines. Except for Braniff, Northwest, Continental and Colonial, mail revenues are of little relative significance. But if airline earnings should be depressed, however, mail revenues could once more assume their former significance for a number of the marginal carriers in avoiding deficit operations.

—Robert H. Wood

7
DC

the latest and greatest Douglas achievement

The new DC-7C, another in the long line of forms created by the Douglas Aircraft Company, sets new standards of passenger comfort and convenience. Powered by four Wright Turbo-Compound engines and using the Bendix® Direct Injection Fuel System, this new giant of the skyways is the latest of Douglas' long line of great transports.

Every detail of interior trim, every mechanical improvement in this great new plane has been designed to make flying as pleasant as possible. Over the years the challenges of faster schedules at lower operating costs has been met by Bendix Products through the development of more efficient fuel measuring. Problems of landing heavier loads at higher speeds have likewise been solved with efficient, high strength and low weight Bendix brakes, struts and landing gear.

Page 1 of 20



BENDIX DIRECT INJECTION FUEL SYSTEM

Lower maintenance costs • Greater engine output • More engine power • Better altitude performance and engine maintenance • Lower operating costs • More accurate fuel metering • More precise air metering

BENDIX • PRODUCTS • SOUTH BEND Bendix

Report Sales: Bendix International Division, 909 E. 48th St., New York 17, N. Y.



swift compact fighters giant aerial fortresses

**FOOTE BROS. SERVES THEM BOTH
WITH PRECISION GEARING
AND MECHANICAL DRIVES**

From the swift McDonnell "Banshee", with its amazing record of fighter performance—from the revolutionary Boeing B-47 that recently flew the Atlantic in 5 hours, 22 minutes, breaking the transatlantic speed record—to the giant Boeing B-52, the newest and mightiest Air Force defense bomber—Foote Bros. serves them all. Gears and mechanical drives rugged in design and construction, jewel-like in precision, all designed to fit a confined space envelope—these are providing better performance, greater speed, simplified operation.

BOEING B-47

BOEING B-52

McDONNELL 2HF-3



THIS TRADE MARK
STANDS FOR
THE FINEST IN
INDUSTRIAL GEARING

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION • 4545 SOUTH WESTERN BOULEVARD • CHICAGO 9, ILLINOIS